Abstract

In this work we compute a reasonably comprehensive set of tables for current and next generation survey facility filter conversions. Almost all useful transforms are included with the ProSpect software package described in Robotham, et al. (2020). Users are free to provide their own filters and compute their own transforms, where the included package examples outline the approach. This arXiv document will be relatively frequently updated, so people are encouraged to get in touch with their suggestions for additional utility (i.e. new filter sets).
Introduction

Converting between filters from different facilities is an important activity in astronomy since we are often trying to compare results from slightly inhomogeneous data sets. Whilst these conversions cannot be done perfectly, these tables use a physically motivated galaxy formation model Shark (Lagos, et al. 2018) processed with the R based ProSpect SED package (Robotham, et al. 2020) applying sensible dust prescriptions to generate best-effort filter mappings as a function of redshift. The latter is important compared to many tables available online, since many of these conversions change significantly with redshift as certain strong features (e.g. 4,000 Angstrom break) slide in and out of filters.

Here we focus on major optical and NIR survey facilities (presently, and soon to come online), where we convert all filters to target Sloan telescope optical (ugriz) and VISTA NIR (ZYJHKs, though note the Ks filter is also referred to as K in this document) filters. The filter responses for these target filters can be seen in the Figure below. The main current reference for Sloan filter transforms is http://www.sdss3.org/dr10/algorithms/sdssUBVRITransform.php, which explicitly notes that the transforms presented there are not optimised for galaxies (they are all based on stars and quasars). The most recent set of transforms for VISTA in the near-infrared can be found in González-Fernández, et al. (2018).

In this reference document we are interested in creating filter transforms that work well for galaxies over a reasonable range in redshift. By combining the ProSpect SED code with the plausible star formation histories (SFH) and metallicity histories (ZH) produced by Shark, we hope to capture the dominant transform effects. For moderate and high redshift galaxies (z > 0.5) these transforms should be a much more reasonable approximation to the usual sets that are available in reference papers (and littered around haphazardly on poorly maintained websites). For a number of current and upcoming surveys, these transforms appear to be entirely novel.

Finally, users are able to generate their own arbitrary mapping between any filter sets available in ProSpect using the Shiny web tool available at http://transformcalc.icrar.org. Currently it is not possible to upload a user defined filter to the web tool because of the computational time required to process the large sample of SFHs (roughly 10-20 seconds for the few 10,000s used). This can be done using the standalone ProSpect software however. A vignette describing how to do this is available at https://rpubs.com/asgr/567881. The caveat here is that the SFHs sampled are not taken from Shark (these take up too much memory to include with the ProSpect package), but are instead randomly generated by sampling the free parameters of the massfunc_b5 star formation history function. Users can also specify the redshift window that they compute their transforms over, which might be more accurate than the coarser grid supplied here.
Methods

Below we outline the linear form of the filter transform used, where we do not include an explicit redshift dependency term. Instead we compute each transform for 14 steps of redshift extending from \( z = 0 \) to \( z \sim 7 \), which covers most practical use cases in observational extra-galactic astronomy.

Filter Mapping Equation

In all cases (where \( F \) is the Target and Reference filter), \( \alpha \) is alpha, \( \beta \) is beta and \( \sigma \) is sigma) the filter mapping is defined by the linear colour equation

\[
F_{\text{Tar}} = F_{\text{Ref}} + \alpha \text{Col} + \beta \pm \sigma.
\]

To determine the best solution for a given target filter and reference facility we compute the minimum of

\[
2\alpha^2 + \beta^2 + \sigma^2
\]

for all possible adjacent linear combinations of the reference facility filters. This solution is the one presented in the following tables, and is a sensible definition of best since it will naturally minimise the effect of photometric errors when computing the mappings, assuming these are similar across the filters.

In general \( F_{\text{Ref}} \) is the filter that is natively closest to the \( F_{\text{Tar}} \) target filter. In the worst case scenario of only having a single filter pre transform, this should be used with the specified \( \beta \) part of the equation to achieve an approximate transform. Obviously, if a user has access to colour information via having multiple reference filters then a more accurate transform is possible.

The wary user should probably disregard solutions where the scatter (\( \sigma \)) is \( > 0.1 \). This would suggest a very poor filter mapping. Also, solutions where \( \alpha > 0.5 \) are dubious, having a very significant colour term that will enhance any colour noise present considerably. However, for consistency we keep all best solutions in these tables (reliable or not). Also, note that a large value of \( \beta (> 0.1) \) implies that the target and reference filters are far apart, and the user might want to exercise caution since the colour terms will become less accurate (e.g. the mapping might have become highly non-linear).

In summary, users should choose reference filters as close as possible to the target filter, and ignore solutions that appear larger than suggested above for the \( \alpha \), \( \beta \) and \( \sigma \) terms.

Cross Facility Mapping Equation

In general, if one wishes to convert between facilities that are not SDSS or VISTA, the following strategy is appropriate. Take an example galaxy at \( z = 0.417 \) mapping to the \( r_{\text{SDSS}} \) filter, where we actually want to convert between \( r_{\text{VST}} \) and \( r_{\text{HSC}} \). We find the following mappings from the tables published below (ignoring the \( \sigma \) term, that just estimates the error in the conversion):

\[
r_{\text{SDSS}} = r_{\text{VST}} + 0.050(g_{\text{VST}} - r_{\text{VST}}) - 0.010
\]

\[
r_{\text{HSC}} = r_{\text{HSC}} - 0.009(g_{\text{HSC}} - r_{\text{HSC}}) + 0.016
\]

With a bit of re-arrangement we get to

\[
r_{\text{HSC}} = r_{\text{VST}} + 0.050(g_{\text{VST}} - r_{\text{VST}}) + 0.009(g_{\text{HSC}} - r_{\text{HSC}}) - 0.026.
\]

Now we make a reasonable (but approximate) assumption that our colour terms (being relative) can be used interchangeably. This gets us to

\[
r_{\text{HSC}} = r_{\text{VST}} + 0.059(g - r) - 0.026.
\]
This is almost exactly the same solution that we recover when directly using **ProSpect** to compute the $r_{HSC}$ to $r_{VST}$ mapping, suggesting our colour approximation should in general work well when the filters are similar. As a consequence, cross facility conversions should use

$$F_{\text{Tar}} = F_{\text{Ref}} + (\alpha_{\text{Ref}} - \alpha_{\text{Tar}})\text{Col} + (\beta_{\text{Ref}} - \beta_{\text{Tar}}).$$

The pseudo $\beta$ values will be more accurate than the pseudo $\alpha$ since we are not making any assumption on the colour behaviour being similar. This will only work reasonably when all of the $\alpha$, $\beta$ and $\sigma$ terms are small (we recommend all should be less than 0.1).

The scatter ($\sigma$) is non-trivial to estimate when mapping across filter sets, but a pessimistic estimate is to add the reference $\sigma$ in quadrature, i.e.:

$$F_{\text{Tar}} = F_{\text{Ref}} + (\alpha_{\text{Ref}} - \alpha_{\text{Tar}})\text{Col} + (\beta_{\text{Ref}} - \beta_{\text{Tar}}) \pm \sqrt{\sigma^2_{\text{Ref}} + \sigma^2_{\text{Tar}}}.$$  

As discussed previously, users can convert more directly between filters that are not the included references sets using the webtool provided at [http://transformcalc.icrar.org](http://transformcalc.icrar.org).

### Application of Conversions To Empirical Data

Below we add a simple example of trying to create target HSC H band photometry based on VISTA photometry using **ProSpect** within an R session. We wish to apply this to the DEVILS survey (Davies, et al. 2018)), which has a typical redshift of around 0.5, so we use the 5 Gyr age SFHs to compute the mapping.

```R
$\text{tarY}_{\text{HSC}} = \text{filterTranMags}($\text{ProFiltTrans_Shark}\$maglist$\text{Age5}[,c("Z\_VISTA", "Y\_VISTA", "J\_VISTA")], \text{ProFiltTrans_Shark}\$maglist$\text{Age5}[,"Y\_HSC"], \text{return} = \text{’bestall’})$

print($\text{tarY}_{\text{HSC}}$params)
```

```r
## $Y\_VISTA + alpha.(Y\_VISTA - J\_VISTA) + beta +/- sigma$
## alpha beta sigma
## 0.253892139 -0.013014625 0.003892386
```

The best solution uses (Y\_VISTA - J\_VISTA) colour data. We can check how this looks against DEVILS D10 data:

```R
$\text{maghist}(\text{D10}[,"mag\_HY\_t" - mag\_Y\_t], \text{breaks}=\text{seq}(-1,1,by=0.01), \text{verbose}=\text{FALSE}, \text{xlim}=\text{c}(-0.5,0.5), \text{ylim}=\text{c}(0,2e3), \text{grid}=\text{TRUE}, \text{xlab} = \text{‘Y\_HSC - Y\_VISTA/Y\_Transform’}, \text{ylab} = \text{‘Counts’})$

$\text{maghist}(\text{D10}[,"mag\_HY\_t" - (mag\_Y\_t + 0.2539*(mag\_Y\_t - mag\_J\_t) + -0.0130)], \text{breaks}=\text{seq}(-1,1,by=0.01), \text{verbose}=\text{F}, \text{add}=\text{T}, \text{border} = \text{‘red’})$

$\text{legend}(\text{’topright’, legend}=\text{c}(\text{‘Y\_VISTA’,\’Y\_Transform’}), \text{col}=\text{c}(\text{‘black’,‘red’}, \text{lt}=\text{1})$
```
It is pretty clear we have a zero-point photometry issue here. The distribution is tighter, but offset from our target of zero. We can apply the offset and improve the result though:

```r
maghist(D10[, mag_HY_t - mag_Y_t], breaks=seq(-1,1,by=0.01), verbose=FALSE, xlim=c(-0.5,0.5), ylim=c(0,2e3), grid=TRUE, xlab='Y_HSC - Y_VISTA/Y_Transform', ylab='Counts')
maghist(D10[, mag_HY_t - (mag_Y_t + 0.2539*(mag_Y_t - mag_J_t) + -0.0603)], breaks=seq(-1,1,by=0.01), verbose=F, add=T, border='red')
legend('topright', legend=c('Y_VISTA','Y_Transform'), col=c('black','red'), lty=1)
```
The above issue highlights that for similar filters the systematic uncertainties due to zero-points probably often dominate over any idealised transform equation. In this case we have no way of knowing whether the error exists in the Y_HSC or Y_VISTA photometry, or perhaps both. The only route to understanding this over all bands is to analyse the multi-band residuals from full ProSpect fits.

We can carry out a test that is less sensitive to such zero-point issues. Instead of trying to predict small filter changes we can generate the transforms for a filter that sits inside a large gap between filters. In this case we will attempt to create a transform for DEVILS that predicts the Y_VISTA filter given surrounding Z_VISTA and J_VISTA filters. In this sense ProSpect can be used to create reasonable missing photometry for galaxies. This might be useful where a user wishes to create a Y_VISTA selection cut, but this data happens to missing for a particular galaxy. If the other photometric data are considered usable, a user might still want to use the galaxy for scientific analysis. This approach is clearly much cheaper computationally than trying to do full ProSpect SED fits to the data and infer the photometry with the outputs (which would also work). In fact, if spectroscopic or photometric redshift data is not available it might be more reasonable to just use an approximate transform.

```
tarY_VISTA = filterTranMags(ProFiltTrans_Shark$maglist$Age4[,c("Z_VISTA", "J_VISTA")],
ProFiltTrans_Shark$maglist$Age4[,"Y_VISTA"], return = 'bestall')
print(tarY_VISTA$params)
## $ Z_VISTA + alpha.(Z_VISTA - J_VISTA) + beta +/- sigma`
## alpha beta sigma
## -0.41812772 -0.04485583 0.01526601

maghist(D10[,mag_Y_t - mag_Z_t], breaks=seq(-1,1,by=0.01), verbose=FALSE, 
xlim=c(-0.5,0.5), ylim=c(0,1.5e3), grid=TRUE, xlab='Y_VISTA - Z_VISTA/Y_Transform',
ylab='Counts')
maghist(D10[,mag_Y_t - (mag_Z_t + -0.4181*(mag_Z_t - mag_J_t) + -0.0449)],
breaks=seq(-1,1,by=0.01), verbose=F, add=T, border='red')
```
There is still a small offset from 0 for the red (transformed) distribution, but it is clearly much tighter and closer to the target filter.

**Conversion Tables**

Below we list the conversion tables for a number of major current and upcoming optical and near-infrared survey facilities. This list is not meant to be exhaustive, as mentioned above specific solutions are available for many more filters through the ProSpect web tool (http://transformcalc.icrar.org), and unavailable filters can be processed by users using ProSpect locally using approaches outlined in the online vignette (https://rpubs.com/asgr/567881).

**VST**

Table 1: Target filter: u_SDSS, Reference facility: VST

| F_Tar | z  | F_Ref | Col         | alpha | beta  | sigma |
|-------|----|-------|-------------|-------|-------|-------|
| u_SDSS | 0.0369 | u    | (u - g)     | 0.0249 | -0.0298 | 0.0015 |
| u_SDSS | 0.1149 | u    | (u - g)     | 0.0225 | -0.0135 | 0.0008 |
| u_SDSS | 0.2025 | u    | (u - g)     | 0.0098 | -0.0045 | 0.0010 |
| u_SDSS | 0.3021 | u    | (u - g)     | 0.0027 | -0.0004 | 0.0020 |
| u_SDSS | 0.4170 | u    | (u - g)     | 0.0193 | -0.0036 | 0.0012 |
| u_SDSS | 0.5519 | u    | (u - g)     | 0.0058 | 0.0001  | 0.0008 |
| u_SDSS | 0.7142 | u    | (u - g)     | 0.0097 | 0.0015  | 0.0016 |
| u_SDSS | 0.9152 | u    | (u - g)     | 0.0185 | 0.0004  | 0.0008 |
### Table 2: Target filter: g_SDSS, Reference facility: VST

| F_Tar | z   | F_Ref | Col   | alpha  | beta   | sigma |
|-------|-----|-------|-------|--------|--------|-------|
| g_SDSS | 0.0369 | g     | (g - r) | -0.0045 | 0.0061 | 0.0017 |
| g_SDSS | 0.1149 | g     | (g - r) | 0.0052  | -0.0009 | 0.0010 |
| g_SDSS | 0.2025 | g     | (u - g) | 0.0133  | -0.0148 | 0.0024 |
| g_SDSS | 0.3021 | g     | (u - g) | 0.0078  | 0.0064  | 0.0026 |
| g_SDSS | 0.4170 | g     | (g - r) | 0.0023  | 0.0208  | 0.0027 |
| g_SDSS | 0.5519 | g     | (u - g) | 0.0040  | 0.0005  | 0.0004 |
| g_SDSS | 0.7142 | g     | (u - g) | 0.0069  | -0.0003 | 0.0003 |
| g_SDSS | 0.9152 | g     | (g - r) | -0.0035 | 0.0008  | 0.0008 |
| g_SDSS | 1.1746 | g     | (u - g) | 0.0084  | -0.0003 | 0.0003 |
| g_SDSS | 1.5293 | g     | (u - g) | 0.0046  | 0.0006  | 0.0005 |
| g_SDSS | 2.0582 | g     | (u - g) | 0.0070  | 0.0007  | 0.0014 |
| g_SDSS | 2.9779 | g     | (u - g) | 0.0173  | -0.0275 | 0.0024 |
| g_SDSS | 5.2891 | g     | (g - r) | 0.0027  | -0.0017 | 0.0004 |

### Table 3: Target filter: r_SDSS, Reference facility: VST

| F_Tar | z   | F_Ref | Col   | alpha  | beta   | sigma |
|-------|-----|-------|-------|--------|--------|-------|
| r_SDSS | 0.0369 | r     | (g - r) | 0.0455  | -0.0056 | 0.0006 |
| r_SDSS | 0.1149 | r     | (g - r) | 0.0433  | 0.0030  | 0.0014 |
| r_SDSS | 0.2025 | r     | (g - r) | 0.0521  | -0.0039 | 0.0023 |
| r_SDSS | 0.3021 | r     | (g - r) | 0.0486  | -0.0117 | 0.0052 |
| r_SDSS | 0.4170 | r     | (g - r) | 0.0847  | -0.0732 | 0.0065 |
| r_SDSS | 0.5519 | r     | (g - r) | 0.0784  | -0.0275 | 0.0123 |
| r_SDSS | 0.7142 | r     | (g - r) | 0.0407  | 0.0589  | 0.0055 |
| r_SDSS | 0.9152 | r     | (g - r) | 0.0559  | 0.0052  | 0.0031 |
| r_SDSS | 1.1746 | r     | (g - r) | 0.0957  | -0.0007 | 0.0036 |
| r_SDSS | 1.5293 | r     | (r - i) | 0.0556  | -0.0003 | 0.0026 |
| r_SDSS | 2.0582 | r     | (g - r) | 0.0406  | 0.0006  | 0.0021 |
| r_SDSS | 2.9779 | r     | (g - r) | 0.0384  | -0.0028 | 0.0019 |
| r_SDSS | 5.2891 | r     | (g - r) | 0.0928  | -0.2914 | 0.0070 |

### Table 4: Target filter: i_SDSS, Reference facility: VST

| F_Tar | z   | F_Ref | Col   | alpha  | beta   | sigma |
|-------|-----|-------|-------|--------|--------|-------|
| i_SDSS | 0.0369 | i     | (r - i) | 0.0705  | -0.0094 | 0.0027 |
| i_SDSS | 0.1149 | i     | (r - i) | 0.0445  | 0.0041  | 0.0020 |
| i_SDSS | 0.2025 | i     | (r - i) | 0.0329  | 0.0032  | 0.0007 |
| i_SDSS | 0.3021 | i     | (r - i) | 0.0338  | -0.0016 | 0.0005 |
| F_Tar  | z    | F_Ref | Col    | alpha | beta  | sigma |
|--------|------|-------|--------|-------|-------|-------|
| i_SDSS| 0.4170 | i     | (r - i) | 0.0536 | -0.0037 | 0.0017 |
| i_SDSS| 0.5519 | i     | (r - i) | 0.0295 | 0.0032  | 0.0028 |
| i_SDSS| 0.7142 | i     | (r - i) | 0.0631 | -0.0519 | 0.0046 |
| i_SDSS| 0.9152 | i     | (r - i) | 0.0656 | -0.0301 | 0.0071 |
| i_SDSS| 1.1746 | i     | (r - i) | 0.0338 | 0.0641  | 0.0078 |
| i_SDSS| 1.5293 | i     | (r - i) | 0.0733 | -0.0014 | 0.0015 |
| i_SDSS| 2.0582 | i     | (i - z) | 0.0459 | 0.0000  | 0.0006 |
| i_SDSS| 2.9779 | i     | (r - i) | 0.0415 | 0.0004  | 0.0007 |
| i_SDSS| 5.2891 | i     | (i - z) | 0.1068 | -0.0014 | 0.0009 |

Table 5: Target filter: z_SDSS, Reference facility: VST

| F_Tar  | z    | F_Ref | Col     | alpha | beta  | sigma |
|--------|------|-------|---------|-------|-------|-------|
| z_SDSS| 0.0369 | z     | (i - z) | -0.0476 | 0.0024 | 0.0022 |
| z_SDSS| 0.1149 | z     | (i - z) | -0.0419 | 0.0038 | 0.0029 |
| z_SDSS| 0.2025 | z     | (i - z) | -0.0530 | 0.0055 | 0.0026 |
| z_SDSS| 0.3021 | z     | (i - z) | -0.0365 | -0.0042 | 0.0018 |
| z_SDSS| 0.4170 | z     | (i - z) | -0.0386 | -0.0015 | 0.0010 |
| z_SDSS| 0.5519 | z     | (i - z) | -0.0228 | 0.0022  | 0.0009 |
| z_SDSS| 0.7142 | z     | (i - z) | -0.0599 | 0.0110  | 0.0019 |
| z_SDSS| 0.9152 | z     | (i - z) | -0.0027 | -0.0064 | 0.0036 |
| z_SDSS| 1.1746 | z     | (i - z) | -0.0834 | 0.0468  | 0.0085 |
| z_SDSS| 1.5293 | z     | (i - z) | -0.0484 | -0.0651 | 0.0076 |
| z_SDSS| 2.0582 | z     | (i - z) | -0.0924 | 0.0023  | 0.0017 |
| z_SDSS| 2.9779 | z     | (i - z) | -0.0662 | 0.0033  | 0.0012 |
| z_SDSS| 5.2891 | z     | (i - z) | 0.0149  | -0.0003 | 0.0008 |

Table 6: Target filter: Z_VISTA, Reference facility: VST
Table 7: Target filter: Y_VISTA, Reference facility: VST

| F_Tar  | z    | F_Ref | Col   | alpha | beta   | sigma |
|--------|------|-------|-------|--------|--------|-------|
| Y_VISTA | 0.0369 | r     | (g - r) | -0.8770 | 0.0143 | 0.0900 |
| Y_VISTA | 0.1149 | z     | (i - z) | -0.7332 | 0.0304 | 0.0272 |
| Y_VISTA | 0.2025 | z     | (i - z) | -0.8780 | 0.0676 | 0.0238 |
| Y_VISTA | 0.3021 | z     | (i - z) | -0.7291 | -0.0163 | 0.0171 |
| Y_VISTA | 0.4170 | z     | (i - z) | -0.6735 | -0.0105 | 0.0081 |
| Y_VISTA | 0.5519 | z     | (i - z) | -0.6064 | 0.0193 | 0.0060 |
| Y_VISTA | 0.7142 | z     | (i - z) | -0.6594 | -0.0492 | 0.0082 |
| Y_VISTA | 0.9152 | z     | (i - z) | -0.5635 | 0.0623 | 0.0350 |
| Y_VISTA | 1.1746 | z     | (i - z) | -1.0611 | 0.5462 | 0.0748 |
| Y_VISTA | 1.5293 | z     | (i - z) | -0.6283 | -0.4970 | 0.0433 |
| Y_VISTA | 2.0582 | z     | (i - z) | -1.1802 | 0.0066 | 0.0250 |
| Y_VISTA | 2.9779 | r     | (g - r) | -0.8992 | 0.0671 | 0.0519 |
| Y_VISTA | 5.2891 | z     | (i - z) | -0.1775 | -0.0031 | 0.0067 |

Table 8: Target filter: J_VISTA, Reference facility: VST

| F_Tar  | z    | F_Ref | Col   | alpha | beta   | sigma |
|--------|------|-------|-------|--------|--------|-------|
| J_VISTA | 0.0369 | r     | (g - r) | -1.1451 | 0.1604 | 0.1390 |
| J_VISTA | 0.1149 | r     | (g - r) | -1.1321 | 0.1517 | 0.1086 |
| J_VISTA | 0.2025 | r     | (g - r) | -1.1555 | 0.1953 | 0.0634 |
| J_VISTA | 0.3021 | g     | (u - g) | -1.1864 | -0.3308 | 0.2189 |
| J_VISTA | 0.4170 | g     | (u - g) | -1.1624 | -0.8231 | 0.2154 |
| J_VISTA | 0.5519 | z     | (i - z) | -1.3359 | 0.0154 | 0.0273 |
| J_VISTA | 0.7142 | r     | (g - r) | -1.3198 | -0.0560 | 0.1438 |
| J_VISTA | 0.9152 | z     | (i - z) | -1.2554 | 0.1242 | 0.0657 |
| J_VISTA | 1.1746 | i     | (r - i) | -1.8826 | -0.3007 | 0.0829 |
| J_VISTA | 1.5293 | z     | (i - z) | -1.6377 | -0.3784 | 0.0554 |
| J_VISTA | 2.0582 | g     | (u - g) | -1.5127 | -0.6486 | 0.3819 |
| J_VISTA | 2.9779 | r     | (g - r) | -1.5704 | 0.1398 | 0.1073 |
| J_VISTA | 5.2891 | z     | (i - z) | -0.7883 | 0.0444 | 0.0139 |

Table 9: Target filter: H_VISTA, Reference facility: VST

| F_Tar  | z    | F_Ref | Col   | alpha | beta   | sigma |
|--------|------|-------|-------|--------|--------|-------|
| H_VISTA | 0.0369 | r     | (g - r) | -1.4029 | 0.2154 | 0.1927 |
| H_VISTA | 0.1149 | r     | (g - r) | -1.3756 | 0.2441 | 0.1546 |
| H_VISTA | 0.2025 | r     | (g - r) | -1.4256 | 0.3819 | 0.1020 |
| H_VISTA | 0.3021 | g     | (u - g) | -1.3030 | -0.1936 | 0.2872 |
| H_VISTA | 0.4170 | g     | (u - g) | -1.2813 | -0.7186 | 0.2852 |
| H_VISTA | 0.5519 | g     | (u - g) | -1.5497 | -1.0195 | 0.3293 |
| H_VISTA | 0.7142 | r     | (g - r) | -1.5321 | 0.0209 | 0.2053 |
| H_VISTA | 0.9152 | r     | (g - r) | -1.6011 | -0.6889 | 0.1962 |
| H_VISTA | 1.1746 | i     | (r - i) | -2.4204 | -0.2569 | 0.1126 |
| H_VISTA | 1.5293 | z     | (i - z) | -2.4707 | -0.3497 | 0.0743 |
| H_VISTA | 2.0582 | g     | (u - g) | -1.8526 | -0.6261 | 0.5019 |
| H_VISTA | 2.9779 | r     | (g - r) | -2.5523 | -0.3032 | 0.2294 |
| H_VISTA | 5.2891 | z     | (i - z) | -1.2982 | 0.1024 | 0.0280 |
Table 10: Target filter: Ks_VISTA, Reference facility: VST

| F_Tar | z  | Col       | alpha | beta  | sigma |
|-------|----|-----------|-------|-------|-------|
| Ks_VISTA 0.0369 | r | (g - r)  | -1.4129 | 0.4681 | 0.2367 |
| Ks_VISTA 0.1149 | r | (g - r)  | -1.4572 | 0.4186 | 0.2043 |
| Ks_VISTA 0.2025 | r | (g - r)  | -1.6271 | 0.5288 | 0.1476 |
| Ks_VISTA 0.3021 | g | (u - g)  | -1.3813 | -0.1645 | 0.3438 |
| Ks_VISTA 0.4170 | g | (u - g)  | -1.3777 | -0.6881 | 0.3398 |
| Ks_VISTA 0.5519 | g | (u - g)  | -1.6623 | -0.9425 | 0.3886 |
| Ks_VISTA 0.7142 | r | (g - r)  | -1.7462 | 0.2512 | 0.2688 |
| Ks_VISTA 0.9152 | r | (g - r)  | -1.8031 | -0.5563 | 0.2514 |
| Ks_VISTA 1.1746 | i | (r - i)  | -2.7868 | -0.1661 | 0.1571 |
| Ks_VISTA 1.5293 | z | (i - z)  | -2.9876 | -0.2973 | 0.1086 |
| Ks_VISTA 2.0582 | g | (u - g)  | -2.0351 | -0.6515 | 0.5727 |
| Ks_VISTA 2.9779 | r | (g - r)  | -3.1240 | -0.1923 | 0.3075 |
| Ks_VISTA 5.2891 | z | (i - z)  | -2.5664 | 0.2959 | 0.0585 |

HSC

Table 11: Target filter: u_SDSS, Reference facility: HSC

| F_Tar | z  | Col       | alpha | beta  | sigma |
|-------|----|-----------|-------|-------|-------|
| u_SDSS 0.0369 | g | g        | 1.1965 | 0.5920 | 0.0414 |
| u_SDSS 0.1149 | g | g        | 1.2119 | 0.5403 | 0.0519 |
| u_SDSS 0.2025 | g | g        | 1.3668 | 0.2782 | 0.0956 |
| u_SDSS 0.3021 | g | g        | 1.6169 | -0.1734 | 0.1456 |
| u_SDSS 0.4170 | g | g        | 2.0605 | -1.0568 | 0.1581 |
| u_SDSS 0.5519 | g | g        | 1.7399 | -1.0458 | 0.1399 |
| u_SDSS 0.7142 | g | g        | 1.1136 | -0.3634 | 0.0909 |
| u_SDSS 0.9152 | g | g        | 0.7442 | -0.0337 | 0.0594 |
| u_SDSS 1.1746 | g | g        | 1.1073 | -0.0278 | 0.0712 |
| u_SDSS 1.5293 | g | g        | 1.5664 | -0.0223 | 0.0756 |
| u_SDSS 2.0582 | g | g        | 1.9675 | 0.0886 | 0.1859 |
| u_SDSS 2.9779 | g | g        | 1.5971 | 1.8041 | 0.1103 |
| u_SDSS 5.2891 | g | g        | 0.4202 | -0.2251 | 0.0921 |

Table 12: Target filter: g_SDSS, Reference facility: HSC

| F_Tar | z  | Col       | alpha | beta  | sigma |
|-------|----|-----------|-------|-------|-------|
| g_SDSS 0.0369 | g | g        | 0.0462 | 0.0028 | 0.0033 |
| g_SDSS 0.1149 | g | g        | 0.0734 | -0.0143 | 0.0025 |
| g_SDSS 0.2025 | g | g        | 0.0741 | 0.0008 | 0.0043 |
| g_SDSS 0.3021 | g | g        | 0.0565 | 0.0333 | 0.0038 |
| g_SDSS 0.4170 | g | g        | 0.0320 | 0.0561 | 0.0100 |
| g_SDSS 0.5519 | g | g        | 0.0776 | -0.0433 | 0.0042 |
| g_SDSS 0.7142 | g | g        | 0.0655 | -0.0200 | 0.0037 |
| g_SDSS 0.9152 | g | g        | 0.0280 | -0.0004 | 0.0028 |
| g_SDSS 1.1746 | g | g        | 0.0431 | -0.0014 | 0.0013 |
| g_SDSS 1.5293 | g | g        | 0.0584 | 0.0009 | 0.0026 |
| g_SDSS 2.0582 | g | g        | 0.0671 | -0.0010 | 0.0021 |
| g_SDSS 2.9779 | g | g        | 0.1204 | -0.0045 | 0.0044 |
Table 13: Target filter: r_SDSS, Reference facility: HSC

| F_Tar | z | F_Ref | Col | alpha | beta | sigma |
|-------|---|-------|-----|-------|------|-------|
| r_SDSS | 0.0369 | r | r | 0.0065 | -0.0076 | 0.0005 |
| r_SDSS | 0.1149 | r | r | 0.0091 | -0.0044 | 0.0006 |
| r_SDSS | 0.2025 | r | r | 0.0093 | 0.0056 | 0.0017 |
| r_SDSS | 0.3021 | r | r | -0.0108 | 0.0093 | 0.0042 |
| r_SDSS | 0.4170 | r | r | 0.0214 | -0.0469 | 0.0050 |
| r_SDSS | 0.5519 | r | r | 0.0525 | -0.0607 | 0.0108 |
| r_SDSS | 0.7142 | r | r | 0.0100 | 0.0273 | 0.0030 |
| r_SDSS | 0.9152 | r | r | 0.0095 | 0.0013 | 0.0013 |
| r_SDSS | 1.1746 | r | r | 0.0298 | -0.0076 | 0.0022 |
| r_SDSS | 1.5293 | r | r | 0.0072 | 0.0005 | 0.0005 |
| r_SDSS | 2.0582 | r | r | -0.0002 | 0.0001 | 0.0014 |
| r_SDSS | 2.9779 | r | r | 0.0147 | -0.0038 | 0.0010 |
| r_SDSS | 5.2891 | r | r | 0.1898 | -0.1419 | 0.0028 |

Table 14: Target filter: i_SDSS, Reference facility: HSC

| F_Tar | z | F_Ref | Col | alpha | beta | sigma |
|-------|---|-------|-----|-------|------|-------|
| i_SDSS | 0.0369 | i | i | 0.1435 | -0.0097 | 0.0044 |
| i_SDSS | 0.1149 | i | i | 0.1197 | 0.0016 | 0.0038 |
| i_SDSS | 0.2025 | i | i | 0.0966 | 0.0043 | 0.0008 |
| i_SDSS | 0.3021 | i | i | 0.1007 | -0.0050 | 0.0011 |
| i_SDSS | 0.4170 | i | i | 0.1007 | 0.0118 | 0.0018 |
| i_SDSS | 0.5519 | i | i | 0.1012 | -0.0081 | 0.0059 |
| i_SDSS | 0.7142 | i | i | 0.1553 | -0.0924 | 0.0078 |
| i_SDSS | 0.9152 | i | i | 0.1260 | -0.0084 | 0.0098 |
| i_SDSS | 1.1746 | i | i | 0.0936 | 0.1049 | 0.0135 |
| i_SDSS | 1.5293 | i | i | 0.1663 | -0.0003 | 0.0037 |
| i_SDSS | 2.0582 | i | i | 0.1056 | -0.0012 | 0.0032 |
| i_SDSS | 2.9779 | i | i | 0.1204 | 0.0014 | 0.0016 |
| i_SDSS | 5.2891 | i | i | 0.1992 | -0.1133 | 0.0036 |

Table 15: Target filter: z_SDSS, Reference facility: HSC

| F_Tar | z | F_Ref | Col | alpha | beta | sigma |
|-------|---|-------|-----|-------|------|-------|
| z_SDSS | 0.0369 | z | z | -0.0639 | -0.0016 | 0.0052 |
| z_SDSS | 0.1149 | z | z | -0.0362 | 0.0049 | 0.0035 |
| z_SDSS | 0.2025 | z | z | -0.0379 | 0.0049 | 0.0016 |
| z_SDSS | 0.3021 | z | z | -0.0636 | 0.0120 | 0.0042 |
| z_SDSS | 0.4170 | z | z | -0.0247 | -0.0154 | 0.0015 |
| z_SDSS | 0.5519 | z | z | -0.0033 | 0.0018 | 0.0020 |
| z_SDSS | 0.7142 | z | z | -0.0831 | 0.0158 | 0.0044 |
| z_SDSS | 0.9152 | z | z | 0.0085 | -0.0083 | 0.0056 |
| F_Tar  | z   | F_Ref | Col | alpha | beta  | sigma |
|--------|-----|-------|-----|-------|-------|-------|
| z_SDSS| 1.1746 | z | z | -0.0623 | 0.0472 | 0.0087 |
| z_SDSS| 1.5293 | z | z | -0.0421 | -0.1190 | 0.0126 |
| z_SDSS| 2.0582 | z | z | -0.0380 | 0.0066 | 0.0012 |
| z_SDSS| 2.9779 | z | z | -0.0544 | 0.0033 | 0.0013 |
| z_SDSS| 5.2891 | z | z | 0.0292 | -0.0017 | 0.0006 |

Table 16: Target filter: Z_VISTA, Reference facility: HSC

| F_Tar  | z   | F_Ref | Col | alpha | beta  | sigma |
|--------|-----|-------|-----|-------|-------|-------|
| Z_VISTA| 0.0369 | z | z | 0.0573 | 0.0008 | 0.0008 |
| Z_VISTA| 0.1149 | z | z | 0.0669 | -0.0014 | 0.0018 |
| Z_VISTA| 0.2025 | z | z | 0.0864 | -0.0031 | 0.0004 |
| Z_VISTA| 0.3021 | z | z | 0.0524 | 0.0163 | 0.0026 |
| Z_VISTA| 0.4170 | z | z | 0.0647 | -0.0038 | 0.0020 |
| Z_VISTA| 0.5519 | z | z | 0.0745 | 0.0013 | 0.0003 |
| Z_VISTA| 0.7142 | z | z | 0.0354 | 0.0243 | 0.0035 |
| Z_VISTA| 0.9152 | z | z | 0.0951 | -0.0192 | 0.0022 |
| Z_VISTA| 1.1746 | z | z | 0.1099 | -0.0458 | 0.0056 |
| Z_VISTA| 1.5293 | z | z | 0.0624 | 0.0049 | 0.0015 |
| Z_VISTA| 2.0582 | z | z | 0.1240 | 0.0022 | 0.0018 |
| Z_VISTA| 2.9779 | z | z | 0.0155 | -0.0014 | 0.0013 |
| Z_VISTA| 5.2891 | z | z | 0.0292 | 0.0003 | 0.0016 |

Table 17: Target filter: Y_VISTA, Reference facility: HSC

| F_Tar  | z   | F_Ref | Col | alpha | beta  | sigma |
|--------|-----|-------|-----|-------|-------|-------|
| Y_VISTA| 0.0369 | Y | Y | -0.4745 | 0.0237 | 0.0050 |
| Y_VISTA| 0.1149 | Y | Y | -0.4938 | -0.0110 | 0.0090 |
| Y_VISTA| 0.2025 | Y | Y | -0.4747 | 0.0119 | 0.0038 |
| Y_VISTA| 0.3021 | Y | Y | -0.4830 | 0.0148 | 0.0021 |
| Y_VISTA| 0.4170 | Y | Y | -0.5124 | 0.0156 | 0.0054 |
| Y_VISTA| 0.5519 | Y | Y | -0.5020 | 0.0118 | 0.0042 |
| Y_VISTA| 0.7142 | Y | Y | -0.3456 | -0.0068 | 0.0026 |
| Y_VISTA| 0.9152 | Y | Y | -0.4234 | -0.0324 | 0.0036 |
| Y_VISTA| 1.1746 | Y | Y | -0.4327 | 0.0644 | 0.0090 |
| Y_VISTA| 1.5293 | Y | Y | -0.5167 | 0.1044 | 0.0255 |
| Y_VISTA| 2.0582 | Y | Y | -0.4158 | -0.0005 | 0.0054 |
| Y_VISTA| 2.9779 | Y | Y | -0.8900 | -0.0182 | 0.0116 |
| Y_VISTA| 5.2891 | z | z | -0.1857 | -0.0038 | 0.0061 |

Table 18: Target filter: J_VISTA, Reference facility: HSC

| F_Tar  | z   | F_Ref | Col | alpha | beta  | sigma |
|--------|-----|-------|-----|-------|-------|-------|
| J_VISTA| 0.0369 | r | r | -1.3073 | 0.1647 | 0.1374 |
| J_VISTA| 0.1149 | r | r | -1.2868 | 0.1494 | 0.1091 |
| J_VISTA| 0.2025 | r | r | -1.3200 | 0.1986 | 0.0618 |
| J_VISTA| 0.3021 | i | i | -1.1511 | -0.0091 | 0.0717 |
### Table 19: Target filter: H_VISTA, Reference facility: HSC

| F_Tar   | z  | F_Ref | Col | alpha | beta | sigma |
|---------|----|-------|-----|-------|------|-------|
| H_VISTA| 0.0369 | r  | r   | -1.5935 | 0.2218 | 0.1906 |
| H_VISTA| 0.1149 | r  | r   | -1.5545 | 0.2425 | 0.1553 |
| H_VISTA| 0.2025 | r  | r   | -1.6179 | 0.3840 | 0.0998 |
| H_VISTA| 0.3021 | i  | i   | -1.6158 | 0.1588 | 0.1306 |
| H_VISTA| 0.4170 | i  | i   | -1.6492 | 0.1526 | 0.0981 |
| H_VISTA| 0.5519 | i  | i   | -1.6739 | 0.2015 | 0.0522 |
| H_VISTA| 0.7142 | r  | r   | -1.7100 | -0.0332 | 0.2037 |
| H_VISTA| 0.9152 | r  | r   | -1.7833 | -0.6983 | 0.1996 |
| H_VISTA| 1.1746 | i  | i   | -2.0272 | -0.1366 | 0.1141 |
| H_VISTA| 1.5293 | i  | i   | -2.5376 | -0.5770 | 0.1661 |
| H_VISTA| 2.0582 | z  | z   | -3.8102 | -0.5124 | 0.1512 |
| H_VISTA| 2.9779 | r  | r   | -2.8949 | -0.2819 | 0.2236 |
| H_VISTA| 5.2891 | z  | z   | -1.4271 | 0.1040 | 0.0272 |

### Table 20: Target filter: Ks_VISTA, Reference facility: HSC

| F_Tar   | z  | F_Ref | Col | alpha | beta | sigma |
|---------|----|-------|-----|-------|------|-------|
| Ks_VISTA| 0.0369 | r  | r   | -1.6080 | 0.4760 | 0.2346 |
| Ks_VISTA| 0.1149 | r  | r   | -1.6422 | 0.4163 | 0.2051 |
| Ks_VISTA| 0.2025 | r  | r   | -1.8401 | 0.5302 | 0.1449 |
| Ks_VISTA| 0.3021 | i  | i   | -1.9485 | 0.2146 | 0.1814 |
| Ks_VISTA| 0.4170 | i  | i   | -2.0215 | 0.2306 | 0.1381 |
| Ks_VISTA| 0.5519 | i  | i   | -2.0718 | 0.3816 | 0.0800 |
| Ks_VISTA| 0.7142 | r  | r   | -1.9443 | 0.1942 | 0.2672 |
| Ks_VISTA| 0.9152 | r  | r   | -2.0025 | -0.5660 | 0.2541 |
| Ks_VISTA| 1.1746 | i  | i   | -2.3412 | -0.0351 | 0.1612 |
| Ks_VISTA| 1.5293 | i  | i   | -2.9291 | -0.5590 | 0.2035 |
| Ks_VISTA| 2.0582 | r  | r   | -4.3298 | -0.6012 | 0.3657 |
| Ks_VISTA| 2.9779 | r  | r   | -3.5375 | -0.1659 | 0.3008 |
| Ks_VISTA| 5.2891 | z  | z   | -2.8407 | 0.3013 | 0.0544 |

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### Table 21: Target filter: u_SDSS, Reference facility: LSST

| F_Tar | z | F_Ref | Col | alpha  | beta   | sigma |
|-------|---|------|-----|--------|--------|-------|
| u_SDSS | 0.0369 | u  | (u - g) | 0.0906 | 0.0526 | 0.0141 |
| u_SDSS | 0.1149 | u  | (u - g) | 0.2019 | -0.1260 | 0.0112 |
| u_SDSS | 0.2025 | u  | (u - g) | 0.2116 | -0.1149 | 0.0099 |
| u_SDSS | 0.3021 | u  | (u - g) | 0.1927 | -0.0797 | 0.0107 |
| u_SDSS | 0.4170 | u  | (u - g) | 0.0813 | -0.0155 | 0.0099 |
| u_SDSS | 0.5519 | u  | (u - g) | 0.0823 | -0.0075 | 0.0112 |
| u_SDSS | 0.7142 | u  | (u - g) | 0.0994 | -0.0017 | 0.0040 |
| u_SDSS | 0.9152 | u  | (u - g) | 0.1417 | -0.0007 | 0.0060 |
| u_SDSS | 1.1746 | u  | (u - g) | 0.1730 | -0.0065 | 0.0076 |
| u_SDSS | 1.5293 | u  | (u - g) | 0.1310 | 0.0079 | 0.0106 |
| u_SDSS | 2.0582 | u  | (u - g) | 0.1064 | 0.0001 | 0.0173 |
| u_SDSS | 2.9779 | u  | (u - g) | 0.1011 | 0.5350 | 0.0390 |
| u_SDSS | 5.2891 | u  | (u - g) | 0.0931 | 0.0741 | 0.0035 |

### Table 22: Target filter: g_SDSS, Reference facility: LSST

| F_Tar | z | F_Ref | Col | alpha  | beta   | sigma |
|-------|---|------|-----|--------|--------|-------|
| g_SDSS | 0.0369 | g  | (u - g) | 0.0180 | -0.0012 | 0.0042 |
| g_SDSS | 0.1149 | g  | (g - r) | 0.0631 | -0.0258 | 0.0023 |
| g_SDSS | 0.2025 | g  | (u - g) | 0.0591 | -0.0307 | 0.0096 |
| g_SDSS | 0.3021 | g  | (u - g) | 0.0295 | 0.0339 | 0.0072 |
| g_SDSS | 0.4170 | g  | (g - r) | 0.0052 | 0.0069 | 0.0104 |
| g_SDSS | 0.5519 | g  | (u - g) | 0.0323 | 0.0022 | 0.0019 |
| g_SDSS | 0.7142 | g  | (u - g) | 0.0526 | 0.0005 | 0.0034 |
| g_SDSS | 0.9152 | g  | (g - r) | 0.0327 | -0.0015 | 0.0020 |
| g_SDSS | 1.1746 | g  | (g - r) | 0.0313 | -0.0016 | 0.0012 |
| g_SDSS | 1.5293 | g  | (u - g) | 0.0291 | 0.0016 | 0.0017 |
| g_SDSS | 2.0582 | g  | (u - g) | 0.0252 | -0.0012 | 0.0066 |
| g_SDSS | 2.9779 | g  | (u - g) | 0.0718 | -0.0874 | 0.0072 |
| g_SDSS | 5.2891 | g  | (g - r) | 0.0145 | -0.0098 | 0.0025 |

### Table 23: Target filter: r_SDSS, Reference facility: LSST

| F_Tar | z | F_Ref | Col | alpha  | beta   | sigma |
|-------|---|------|-----|--------|--------|-------|
| r_SDSS | 0.0369 | r  | (g - r) | 0.0093 | -0.0082 | 0.0005 |
| r_SDSS | 0.1149 | r  | (g - r) | 0.0098 | -0.0026 | 0.0004 |
| r_SDSS | 0.2025 | r  | (g - r) | 0.0103 | 0.0031 | 0.0011 |
| r_SDSS | 0.3021 | r  | (r - i) | -0.0029 | 0.0062 | 0.0033 |
| r_SDSS | 0.4170 | r  | (g - r) | 0.0200 | -0.0355 | 0.0035 |
| r_SDSS | 0.5519 | r  | (g - r) | 0.0379 | -0.0400 | 0.0079 |
| r_SDSS | 0.7142 | r  | (g - r) | 0.0050 | 0.0183 | 0.0019 |
| r_SDSS | 0.9152 | r  | (g - r) | 0.0098 | 0.0002 | 0.0011 |
| r_SDSS | 1.1746 | r  | (g - r) | 0.0291 | -0.0015 | 0.0015 |
| r_SDSS | 1.5293 | r  | (r - i) | 0.0166 | 0.0004 | 0.0003 |
| r_SDSS | 2.0582 | r  | (g - r) | 0.0036 | 0.0001 | 0.0009 |
| r_SDSS | 2.9779 | r  | (g - r) | 0.0124 | -0.0024 | 0.0008 |
| r_SDSS | 5.2891 | r  | (r - i) | 0.1655 | -0.1038 | 0.0015 |
Table 24: Target filter: i_SDSS, Reference facility: LSST

| F_Tar     | z  | F_Ref | Col     | alpha  | beta   | sigma |
|-----------|----|-------|---------|--------|--------|-------|
| i_SDSS   | 0.0369 | i     | (r - i) | 0.0164 | 0.0000 | 4e-04 |
| i_SDSS   | 0.1149 | i     | (r - i) | 0.0120 | 0.0013 | 2e-04 |
| i_SDSS   | 0.2025 | i     | (r - i) | 0.0140 | -0.0022| 2e-04 |
| i_SDSS   | 0.3021 | i     | (r - i) | 0.0131 | 0.0007 | 2e-04 |
| i_SDSS   | 0.4170 | i     | (r - i) | 0.0126 | 0.0018 | 3e-04 |
| i_SDSS   | 0.5519 | i     | (r - i) | 0.0112 | -0.0018| 1e-03 |
| i_SDSS   | 0.7142 | i     | (r - i) | 0.0226 | -0.0097| 1e-03 |
| i_SDSS   | 0.9152 | i     | (r - i) | 0.0137 | 0.0062 | 6e-04 |
| i_SDSS   | 1.1746 | i     | (r - i) | 0.0141 | -0.0026| 3e-04 |
| i_SDSS   | 1.5293 | i     | (r - i) | 0.0211 | 0.0001 | 5e-04 |
| i_SDSS   | 2.0582 | i     | (i - z) | 0.0166 | -0.0001| 2e-04 |
| i_SDSS   | 2.9779 | i     | (r - i) | 0.0159 | 0.0001 | 2e-04 |
| i_SDSS   | 5.2891 | i     | (i - z) | 0.0087 | 0.0000 | 1e-03 |

Table 25: Target filter: z_SDSS, Reference facility: LSST

| F_Tar     | z  | F_Ref | Col     | alpha  | beta   | sigma |
|-----------|----|-------|---------|--------|--------|-------|
| z_SDSS   | 0.0369 | z     | (i - z) | -0.2064| 0.0012 | 0.0068|
| z_SDSS   | 0.1149 | z     | (i - z) | -0.2009| 0.0127 | 0.0029|
| z_SDSS   | 0.2025 | z     | (i - z) | -0.2343| 0.0151 | 0.0043|
| z_SDSS   | 0.3021 | z     | (i - z) | -0.1959| -0.0054| 0.0028|
| z_SDSS   | 0.4170 | z     | (i - z) | -0.1700| 0.0014 | 0.0016|
| z_SDSS   | 0.5519 | z     | (i - z) | -0.1708| -0.0002| 0.0012|
| z_SDSS   | 0.7142 | z     | (i - z) | -0.1612| -0.0359| 0.0038|
| z_SDSS   | 0.9152 | z     | (i - z) | -0.1812| 0.0427 | 0.0083|
| z_SDSS   | 1.1746 | z     | (i - z) | -0.2576| 0.1161 | 0.0225|
| z_SDSS   | 1.5293 | z     | (i - z) | -0.1865| -0.1275| 0.0145|
| z_SDSS   | 2.0582 | z     | (z - y) | -0.2949| 0.0017 | 0.0030|
| z_SDSS   | 2.9779 | z     | (i - z) | -0.1702| 0.0046 | 0.0040|
| z_SDSS   | 5.2891 | z     | (i - z) | -0.0582| -0.0043| 0.0017|

Table 26: Target filter: Z_VISTA, Reference facility: LSST

| F_Tar     | z  | F_Ref | Col     | alpha  | beta   | sigma |
|-----------|----|-------|---------|--------|--------|-------|
| Z_VISTA  | 0.0369 | z     | (i - z) | -0.0926| 0.0032 | 0.0017|
| Z_VISTA  | 0.1149 | z     | (i - z) | -0.1003| 0.0056 | 0.0010|
| Z_VISTA  | 0.2025 | z     | (i - z) | -0.1095| 0.0060 | 0.0026|
| Z_VISTA  | 0.3021 | z     | (i - z) | -0.0827| -0.0023| 0.0005|
| Z_VISTA  | 0.4170 | z     | (i - z) | -0.0851| 0.0110 | 0.0009|
| Z_VISTA  | 0.5519 | z     | (i - z) | -0.0942| -0.0003| 0.0021|
| Z_VISTA  | 0.7142 | z     | (i - z) | -0.0562| -0.0205| 0.0027|
| Z_VISTA  | 0.9152 | z     | (i - z) | -0.1089| 0.0311 | 0.0030|
| Z_VISTA  | 1.1746 | z     | (z - y) | -0.1051| -0.0275| 0.0030|
| Z_VISTA  | 1.5293 | z     | (i - z) | -0.0901| -0.0023| 0.0008|
| Z_VISTA  | 2.0582 | z     | (z - y) | -0.1397| -0.0013| 0.0026|
| Z_VISTA  | 2.9779 | z     | (i - z) | -0.1095| 0.0001 | 0.0018|
| Z_VISTA  | 5.2891 | z     | (i - z) | -0.0588| -0.0022| 0.0006|
### Table 27: Target filter: Y\_VISTA, Reference facility: LSST

| F\_Tar   | z   | F\_Ref | Col          | alpha | beta  | sigma |
|----------|-----|--------|--------------|-------|-------|-------|
| Y\_VISTA | 0.0369 | y  | (z - y)     | -0.4673 | 0.0259 | 0.0037 |
| Y\_VISTA | 0.1149 | y  | (z - y)     | -0.4174 | -0.0085 | 0.0098 |
| Y\_VISTA | 0.2025 | y  | (z - y)     | -0.4273 | 0.0141 | 0.0040 |
| Y\_VISTA | 0.3021 | y  | (z - y)     | -0.4893 | 0.0248 | 0.0050 |
| Y\_VISTA | 0.4170 | y  | (z - y)     | -0.3880 | -0.0171 | 0.0045 |
| Y\_VISTA | 0.5519 | y  | (z - y)     | -0.4068 | 0.0141 | 0.0023 |
| Y\_VISTA | 0.7142 | y  | (z - y)     | -0.3499 | 0.0056 | 0.0021 |
| Y\_VISTA | 0.9152 | y  | (z - y)     | -0.3020 | -0.0635 | 0.0074 |
| Y\_VISTA | 1.1746 | y  | (z - y)     | -0.4143 | 0.0873 | 0.0099 |
| Y\_VISTA | 1.5293 | y  | (z - y)     | -0.4659 | 0.0383 | 0.0164 |
| Y\_VISTA | 2.0582 | y  | (z - y)     | -0.3506 | 0.0028 | 0.0076 |
| Y\_VISTA | 2.9779 | y  | (z - y)     | -0.7973 | -0.0148 | 0.0112 |
| Y\_VISTA | 5.2891 | z  | (i - z)     | -0.2455 | -0.0081 | 0.0078 |

### Table 28: Target filter: J\_VISTA, Reference facility: LSST

| F\_Tar   | z   | F\_Ref | Col          | alpha | beta  | sigma |
|----------|-----|--------|--------------|-------|-------|-------|
| J\_VISTA | 0.0369 | r  | (g - r)     | -1.2784 | 0.1619 | 0.1365 |
| J\_VISTA | 0.1149 | r  | (g - r)     | -1.2805 | 0.1712 | 0.1066 |
| J\_VISTA | 0.2025 | r  | (g - r)     | -1.3281 | 0.2225 | 0.0635 |
| J\_VISTA | 0.3021 | i  | (r - i)     | -1.3627 | 0.0058 | 0.0739 |
| J\_VISTA | 0.4170 | g  | (u - g)     | -1.2309 | -0.7018 | 0.2148 |
| J\_VISTA | 0.5519 | i  | (r - i)     | -1.3651 | 0.0330 | 0.0585 |
| J\_VISTA | 0.7142 | r  | (g - r)     | -1.4720 | -0.1339 | 0.1449 |
| J\_VISTA | 0.9152 | y  | (z - y)     | -1.5121 | -0.1654 | 0.0149 |
| J\_VISTA | 1.1746 | y  | (z - y)     | -1.4091 | 0.1113 | 0.0560 |
| J\_VISTA | 1.5293 | z  | (i - z)     | -1.8969 | -0.5372 | 0.0605 |
| J\_VISTA | 2.0582 | y  | (z - y)     | -1.6195 | -0.5902 | 0.0716 |
| J\_VISTA | 2.9779 | r  | (g - r)     | -1.7874 | 0.1626 | 0.1031 |
| J\_VISTA | 5.2891 | z  | (i - z)     | -0.8415 | 0.0362 | 0.0152 |

### Table 29: Target filter: H\_VISTA, Reference facility: LSST

| F\_Tar   | z   | F\_Ref | Col          | alpha | beta  | sigma |
|----------|-----|--------|--------------|-------|-------|-------|
| H\_VISTA | 0.0369 | r  | (g - r)     | -1.5597 | 0.2189 | 0.1896 |
| H\_VISTA | 0.1149 | r  | (g - r)     | -1.5489 | 0.2694 | 0.1524 |
| H\_VISTA | 0.2025 | r  | (g - r)     | -1.6273 | 0.4133 | 0.1018 |
| H\_VISTA | 0.3021 | g  | (u - g)     | -1.5194 | -0.0111 | 0.2786 |
| H\_VISTA | 0.4170 | g  | (u - g)     | -1.3580 | -0.5892 | 0.2849 |
| H\_VISTA | 0.5519 | g  | (u - g)     | -1.6194 | -0.9917 | 0.3154 |
| H\_VISTA | 0.7142 | r  | (g - r)     | -1.7014 | -0.0635 | 0.2068 |
| H\_VISTA | 0.9152 | r  | (g - r)     | -1.7914 | -0.6990 | 0.1989 |
| H\_VISTA | 1.1746 | y  | (z - y)     | -2.2945 | 0.1428 | 0.0899 |
| H\_VISTA | 1.5293 | z  | (i - z)     | -2.7932 | -0.5590 | 0.0804 |
| H\_VISTA | 2.0582 | g  | (u - g)     | -2.0565 | -0.6112 | 0.4855 |
| H\_VISTA | 2.9779 | g  | (u - g)     | -2.2993 | 2.2036 | 0.3526 |
| H\_VISTA | 5.2891 | z  | (i - z)     | -1.3380 | 0.0915 | 0.0299 |
| F_Tar   | z     | F_Ref | Col  | alpha | beta | sigma |
|---------|-------|-------|------|-------|------|-------|
| Ks_VISTA 0.0369 | r (g - r) | -1.5752 | 0.4736 | 0.2336 |
| Ks_VISTA 0.1149 | r (g - r) | -1.6397 | 0.4462 | 0.2019 |
| Ks_VISTA 0.2025 | r (g - r) | -1.8490 | 0.5628 | 0.1475 |
| Ks_VISTA 0.3021 | g (u - g) | -1.6133 | 0.0285 | 0.3350 |
| Ks_VISTA 0.4170 | g (u - g) | -1.4608 | -0.5524 | 0.3395 |
| Ks_VISTA 0.5519 | g (u - g) | -1.7415 | -0.9116 | 0.3738 |
| Ks_VISTA 0.7142 | r (g - r) | -1.9329 | 0.1603 | 0.2707 |
| Ks_VISTA 0.9152 | r (g - r) | -2.0110 | -0.5668 | 0.2538 |
| Ks_VISTA 1.1746 | i (r - i) | -2.6246 | -0.4359 | 0.1569 |
| Ks_VISTA 1.5293 | z (i - z) | -3.3562 | -0.5369 | 0.1087 |
| Ks_VISTA 2.0582 | g (u - g) | -2.2608 | -0.6349 | 0.5556 |
| Ks_VISTA 2.9779 | g (u - g) | -2.6725 | 2.7210 | 0.4399 |
| Ks_VISTA 5.2891 | z (i - z) | -2.5736 | 0.2780 | 0.0618 |

**UKIRT**

| F_Tar   | z     | F_Ref | Col  | alpha | beta | sigma |
|---------|-------|-------|------|-------|------|-------|
| u_SDSS 0.0369 | Z (Z - Y) | 3.6527 | 1.6000 | 0.3116 |
| u_SDSS 0.1149 | H (H - K) | 4.7195 | 2.8144 | 0.5250 |
| u_SDSS 0.2025 | Y (Y - J) | 5.4409 | 1.8612 | 0.5022 |
| u_SDSS 0.3021 | Y (Y - J) | 5.8717 | 1.7622 | 0.5322 |
| u_SDSS 0.4170 | J (J - H) | 6.3523 | 2.4594 | 0.6025 |
| u_SDSS 0.5519 | J (J - H) | 6.4291 | 2.0348 | 0.6660 |
| u_SDSS 0.7142 | J (J - H) | 7.5205 | 1.4954 | 0.5983 |
| u_SDSS 0.9152 | Z (Z - Y) | 7.0061 | 0.8097 | 0.2728 |
| u_SDSS 1.1746 | Z (Z - Y) | 4.2352 | 0.9571 | 0.3382 |
| u_SDSS 1.5293 | Y (Y - J) | 4.5175 | 1.0251 | 0.3308 |
| u_SDSS 2.0582 | Z (Z - Y) | 3.9681 | 1.8290 | 0.2938 |
| u_SDSS 2.9779 | J (J - H) | 2.9697 | 0.6927 | 0.3590 |
| u_SDSS 5.2891 | H (H - K) | 4.1115 | 6.8442 | 0.2328 |

| F_Tar   | z     | F_Ref | Col  | alpha | beta | sigma |
|---------|-------|-------|------|-------|------|-------|
| g_SDSS 0.0369 | Z (Z - Y) | 2.2815 | 0.6229 | 0.2025 |
| g_SDSS 0.1149 | Z (Z - Y) | 3.6202 | 0.5635 | 0.2145 |
| g_SDSS 0.2025 | Y (Y - J) | 3.9299 | 0.9192 | 0.2771 |
| g_SDSS 0.3021 | Y (Y - J) | 4.1882 | 0.9963 | 0.2651 |
| g_SDSS 0.4170 | J (J - H) | 4.2646 | 1.7358 | 0.2924 |
| g_SDSS 0.5519 | J (J - H) | 4.6087 | 1.5911 | 0.3716 |
| g_SDSS 0.7142 | Z (Z - Y) | 5.8668 | 0.4358 | 0.1258 |
| g_SDSS 0.9152 | Z (Z - Y) | 5.2834 | 0.7740 | 0.1704 |
| g_SDSS 1.1746 | Z (Z - Y) | 3.0226 | 0.8727 | 0.2243 |
| g_SDSS 1.5293 | Y (Y - J) | 3.4500 | 0.9187 | 0.2170 |
| g_SDSS 2.0582 | Z (Z - Y) | 2.2056 | 0.0471 | 0.1055 |
| g_SDSS 2.9779 | J (J - H) | 2.0565 | -0.8556 | 0.2046 |
### Table 33: Target filter: r_SDSS, Reference facility: UKIRT

| F_Tar | z  | F_Ref | Col       | alpha | beta | sigma |
|-------|----|-------|-----------|-------|------|-------|
| r_SDSS | 0.0369 | Z     | (Z - Y)   | 1.2826 | 0.2454 | 0.0796 |
| r_SDSS | 0.1149 | Z     | (Z - Y)   | 1.6846 | 0.2370 | 0.0885 |
| r_SDSS | 0.2025 | Y     | (Y - J)   | 1.9665 | 0.4156 | 0.1414 |
| r_SDSS | 0.3021 | Y     | (Y - J)   | 2.0287 | 0.3973 | 0.1565 |
| r_SDSS | 0.4170 | J     | (J - H)   | 2.8847 | 0.7114 | 0.1888 |
| r_SDSS | 0.5519 | J     | (J - H)   | 3.3855 | 0.6862 | 0.2152 |
| r_SDSS | 0.7142 | Z     | (Z - Y)   | 2.9173 | 0.3008 | 0.0543 |
| r_SDSS | 0.9152 | Z     | (Z - Y)   | 2.6051 | 0.7041 | 0.0859 |
| r_SDSS | 1.1746 | Z     | (Z - Y)   | 1.8372 | 0.7695 | 0.1304 |
| r_SDSS | 1.5293 | Z     | (Z - Y)   | 2.3274 | -1.3224 | 0.1568 |
| r_SDSS | 2.0582 | Z     | (Z - Y)   | 1.2349 | 0.0194 | 0.0440 |
| r_SDSS | 2.9779 | Y     | (Y - J)   | 1.3944 | 0.0414 | 0.0328 |
| r_SDSS | 5.2891 | H     | (H - K)   | 2.2087 | 0.8811 | 0.0809 |

### Table 34: Target filter: i_SDSS, Reference facility: UKIRT

| F_Tar | z  | F_Ref | Col       | alpha | beta | sigma |
|-------|----|-------|-----------|-------|------|-------|
| i_SDSS | 0.0369 | Z     | (Z - Y)   | 0.8068 | 0.0598 | 0.0289 |
| i_SDSS | 0.1149 | Z     | (Z - Y)   | 0.9055 | 0.0817 | 0.0294 |
| i_SDSS | 0.2025 | Z     | (Z - Y)   | 0.8420 | 0.0995 | 0.0235 |
| i_SDSS | 0.3021 | Z     | (Z - Y)   | 1.0124 | 0.0141 | 0.0234 |
| i_SDSS | 0.4170 | Z     | (Z - Y)   | 1.3925 | -0.0390 | 0.0106 |
| i_SDSS | 0.5519 | Z     | (Z - Y)   | 1.4987 | 0.0238 | 0.0104 |
| i_SDSS | 0.7142 | Z     | (Z - Y)   | 1.4112 | -0.1241 | 0.0156 |
| i_SDSS | 0.9152 | Z     | (Z - Y)   | 1.3082 | 0.1553 | 0.0598 |
| i_SDSS | 1.1746 | Z     | (Z - Y)   | 0.5947 | 0.6404 | 0.0713 |
| i_SDSS | 1.5293 | Z     | (Z - Y)   | 1.1921 | -0.6830 | 0.0695 |
| i_SDSS | 2.0582 | Z     | (Z - Y)   | 0.7233 | 0.0111 | 0.0208 |
| i_SDSS | 2.9779 | Z     | (Z - Y)   | 0.8173 | 0.0301 | 0.0138 |
| i_SDSS | 5.2891 | H     | (H - K)   | 1.5489 | 0.2217 | 0.0492 |

### Table 35: Target filter: z_SDSS, Reference facility: UKIRT

| F_Tar | z  | F_Ref | Col       | alpha | beta | sigma |
|-------|----|-------|-----------|-------|------|-------|
| z_SDSS | 0.0369 | Z     | (Z - Y)   | -0.1088 | -0.0039 | 0.0018 |
| z_SDSS | 0.1149 | Z     | (Z - Y)   | -0.0868 | 0.0024 | 0.0098 |
| z_SDSS | 0.2025 | Z     | (Z - Y)   | -0.0879 | -0.0001 | 0.0011 |
| z_SDSS | 0.3021 | Z     | (Z - Y)   | -0.1119 | -0.0001 | 0.0008 |
| z_SDSS | 0.4170 | Z     | (Z - Y)   | -0.0900 | -0.0097 | 0.0009 |
| z_SDSS | 0.5519 | Z     | (Z - Y)   | -0.0839 | -0.0002 | 0.0016 |
| z_SDSS | 0.7142 | Z     | (Z - Y)   | -0.1340 | 0.0090 | 0.0019 |
| z_SDSS | 0.9152 | Z     | (Z - Y)   | -0.0841 | -0.0009 | 0.0025 |
### Table 36: Target filter: Z\_VISTA, Reference facility: UKIRT

| F\_Tar | z   | F\_Ref | Col   | alpha | beta  | sigma |
|--------|-----|--------|-------|-------|-------|-------|
| Z\_SDSS | 1.1746 | Z   | (Z - Y) | -0.1275 | 0.0143 | 0.0043 |
| Z\_SDSS | 1.5293 | Z   | (Z - Y) | -0.1438 | -0.0355 | 0.0073 |
| Z\_SDSS | 2.0582 | Z   | (Z - Y) | -0.1210 | 0.0024 | 0.0022 |
| Z\_SDSS | 2.9779 | Z   | (Z - Y) | -0.0775 | 0.0028 | 0.0013 |
| Z\_SDSS | 5.2891 | Z   | (Z - Y) | -0.0020 | -0.0001 | 0.0017 |

### Table 37: Target filter: Y\_VISTA, Reference facility: UKIRT

| F\_Tar | z   | F\_Ref | Col   | alpha | beta  | sigma |
|--------|-----|--------|-------|-------|-------|-------|
| Z\_SDSS | 0.0369 | Z   | (Z - Y) | 0.0126 | 0.0015 | 0.0003 |
| Z\_SDSS | 0.1149 | Z   | (Z - Y) | 0.0115 | 0.0013 | 0.0008 |
| Z\_SDSS | 0.2025 | Z   | (Z - Y) | 0.0158 | 0.0014 | 0.0005 |
| Z\_SDSS | 0.3021 | Z   | (Z - Y) | 0.0100 | 0.0013 | 0.0008 |
| Z\_SDSS | 0.4170 | Z   | (Z - Y) | 0.0159 | -0.0023 | 0.0007 |
| Z\_SDSS | 0.5519 | Z   | (Z - Y) | 0.0187 | 0.0013 | 0.0004 |
| Z\_SDSS | 0.7142 | Z   | (Z - Y) | 0.0046 | 0.0088 | 0.0011 |
| Z\_SDSS | 0.9152 | Z   | (Z - Y) | 0.0286 | -0.0044 | 0.0009 |
| Z\_SDSS | 1.1746 | Z   | (Z - Y) | 0.0149 | 0.0048 | 0.0008 |
| Z\_SDSS | 1.5293 | Z   | (Z - Y) | 0.0064 | -0.0035 | 0.0007 |
| Z\_SDSS | 2.0582 | Z   | (Z - Y) | 0.0065 | 0.0000 | 0.0008 |
| Z\_SDSS | 2.9779 | Z   | (Z - Y) | -0.0218 | -0.0006 | 0.0008 |
| Z\_SDSS | 5.2891 | Z   | (Z - Y) | 0.0208 | 0.0010 | 0.0002 |

### Table 38: Target filter: J\_VISTA, Reference facility: UKIRT

| F\_Tar | z   | F\_Ref | Col   | alpha | beta  | sigma |
|--------|-----|--------|-------|-------|-------|-------|
| Z\_SDSS | 0.0369 | J   | (J - H) | -0.0123 | 0.0001 | 4e-04 |
| Z\_SDSS | 0.1149 | J   | (Y - J) | -0.0169 | 0.0004 | 3e-04 |
| Z\_SDSS | 0.2025 | J   | (Y - J) | -0.0178 | 0.0030 | 6e-04 |
| Z\_SDSS | 0.3021 | J   | (J - H) | -0.0176 | 0.0002 | 5e-04 |
| F_Tar   | z   | F_Ref | Col     | alpha | beta  | sigma |
|---------|-----|-------|---------|-------|-------|-------|
| J_VISTA | 0.4170 | J   | (J - H) | -0.0138 | -0.0013 | 3e-04 |
| J_VISTA | 0.5519 | J   | (J - H) | -0.0089 | 0.0004  | 4e-04 |
| J_VISTA | 0.7142 | J   | (J - H) | -0.0116 | -0.0002 | 5e-04 |
| J_VISTA | 0.9152 | J   | (J - H) | -0.0131 | -0.0022 | 3e-04 |
| J_VISTA | 1.1746 | J   | (Y - J) | -0.0112 | -0.0004 | 3e-04 |
| J_VISTA | 1.5293 | J   | (Y - J) | -0.0113 | -0.0014 | 9e-04 |
| J_VISTA | 2.0582 | J   | (J - H) | -0.0145 | 0.0007  | 9e-04 |
| J_VISTA | 2.9779 | J   | (J - H) | -0.0111 | 0.0062  | 4e-04 |
| J_VISTA | 5.2891 | J   | (Y - J) | -0.0174 | -0.0007 | 2e-04 |

Table 39: Target filter: H_VISTA, Reference facility: UKIRT

| F_Tar   | z   | F_Ref | Col     | alpha | beta  | sigma |
|---------|-----|-------|---------|-------|-------|-------|
| H_VISTA | 0.0369 | H   | (J - H) | -0.0426 | 0.0017 | 0.0011 |
| H_VISTA | 0.1149 | H   | (H - K) | -0.0293 | -0.0072 | 0.0010 |
| H_VISTA | 0.2025 | H   | (H - K) | -0.0155 | -0.0016 | 0.0009 |
| H_VISTA | 0.3021 | H   | (J - H) | -0.0239 | -0.0021 | 0.0006 |
| H_VISTA | 0.4170 | H   | (J - H) | -0.0248 | 0.0014 | 0.0003 |
| H_VISTA | 0.5519 | H   | (J - H) | -0.0267 | 0.0038 | 0.0005 |
| H_VISTA | 0.7142 | H   | (H - K) | -0.0242 | -0.0021 | 0.0007 |
| H_VISTA | 0.9152 | H   | (J - H) | -0.0222 | 0.0001 | 0.0009 |
| H_VISTA | 1.1746 | H   | (J - H) | -0.0256 | 0.0017 | 0.0007 |
| H_VISTA | 1.5293 | H   | (J - H) | -0.0209 | -0.0002 | 0.0002 |
| H_VISTA | 2.0582 | H   | (J - H) | -0.0214 | -0.0058 | 0.0009 |
| H_VISTA | 2.9779 | H   | (J - H) | -0.0251 | 0.0044 | 0.0018 |
| H_VISTA | 5.2891 | H   | (H - K) | -0.0129 | 0.0005 | 0.0002 |

Table 40: Target filter: Ks_VISTA, Reference facility: UKIRT

| F_Tar   | z   | F_Ref | Col     | alpha | beta  | sigma |
|---------|-----|-------|---------|-------|-------|-------|
| Ks_VISTA | 0.0369 | K   | (H - K) | 0.0597  | -0.0160 | 0.0023 |
| Ks_VISTA | 0.1149 | K   | (H - K) | 0.0560  | -0.0170 | 0.0018 |
| Ks_VISTA | 0.2025 | K   | (H - K) | 0.0206  | -0.0212 | 0.0021 |
| Ks_VISTA | 0.3021 | K   | (H - K) | 0.0470  | -0.0179 | 0.0023 |
| Ks_VISTA | 0.4170 | K   | (H - K) | 0.0882  | -0.0012 | 0.0027 |
| Ks_VISTA | 0.5519 | K   | (H - K) | 0.0744  | 0.0065 | 0.0011 |
| Ks_VISTA | 0.7142 | K   | (H - K) | 0.0717  | 0.0076 | 0.0020 |
| Ks_VISTA | 0.9152 | K   | (H - K) | 0.0758  | -0.0048 | 0.0008 |
| Ks_VISTA | 1.1746 | K   | (H - K) | 0.0973  | -0.0151 | 0.0014 |
| Ks_VISTA | 1.5293 | K   | (H - K) | 0.0537  | 0.0026 | 0.0024 |
| Ks_VISTA | 2.0582 | K   | (H - K) | 0.0601  | 0.0043 | 0.0015 |
| Ks_VISTA | 2.9779 | K   | (H - K) | 0.0604  | 0.0026 | 0.0010 |
| Ks_VISTA | 5.2891 | K   | (H - K) | 0.1096  | 0.0256 | 0.0022 |

2MASS
Table 41: Target filter: u_SDSS, Reference facility: 2MASS

| F_Tar    | z  | F_Ref | Col     | alpha  | beta  | sigma |
|----------|----|-------|---------|--------|-------|-------|
| u_SDSS  | 0.0369 | H (H - K) | 4.8781 | 3.2002 | 0.5013 |
| u_SDSS  | 0.1149 | H (H - K) | 5.1784 | 2.7786 | 0.5228 |
| u_SDSS  | 0.2025 | J (J - H) | 6.5580 | 2.3031 | 0.4438 |
| u_SDSS  | 0.3021 | J (J - H) | 5.4381 | 2.4685 | 0.5008 |
| u_SDSS  | 0.4170 | J (J - H) | 5.9470 | 2.4203 | 0.6032 |
| u_SDSS  | 0.5519 | J (J - H) | 5.9968 | 2.0111 | 0.6546 |
| u_SDSS  | 0.7142 | J (J - H) | 7.1665 | 1.3751 | 0.5896 |
| u_SDSS  | 0.9152 | J (J - H) | 7.7028 | 0.9156 | 0.4469 |
| u_SDSS  | 1.1746 | J (J - H) | 7.7791 | 0.5908 | 0.3582 |
| u_SDSS  | 1.5293 | J (J - H) | 5.9292 | 0.6195 | 0.3348 |
| u_SDSS  | 2.0582 | J (J - H) | 4.6004 | 0.7743 | 0.4544 |
| u_SDSS  | 2.9779 | J (J - H) | 2.7381 | 0.7794 | 0.3530 |
| u_SDSS  | 5.2891 | H (H - K) | 4.6837 | 6.9673 | 0.2270 |

Table 42: Target filter: g_SDSS, Reference facility: 2MASS

| F_Tar    | z  | F_Ref | Col     | alpha  | beta  | sigma |
|----------|----|-------|---------|--------|-------|-------|
| g_SDSS  | 0.0369 | J (J - H) | 4.0230 | 0.5654 | 0.1843 |
| g_SDSS  | 0.1149 | J (J - H) | 4.5484 | 0.8298 | 0.2098 |
| g_SDSS  | 0.2025 | J (J - H) | 4.8186 | 1.2544 | 0.2342 |
| g_SDSS  | 0.3021 | J (J - H) | 3.9974 | 1.5250 | 0.2394 |
| g_SDSS  | 0.4170 | J (J - H) | 3.9811 | 1.7073 | 0.2930 |
| g_SDSS  | 0.5519 | J (J - H) | 4.2707 | 1.5731 | 0.3625 |
| g_SDSS  | 0.7142 | J (J - H) | 5.5906 | 1.1877 | 0.3762 |
| g_SDSS  | 0.9152 | J (J - H) | 6.3372 | 0.8481 | 0.3106 |
| g_SDSS  | 1.1746 | J (J - H) | 6.2744 | 0.5835 | 0.1941 |
| g_SDSS  | 1.5293 | J (J - H) | 4.8091 | 0.5884 | 0.1941 |
| g_SDSS  | 2.0582 | J (J - H) | 3.2967 | 0.6106 | 0.2336 |
| g_SDSS  | 2.9779 | J (J - H) | 1.8825 | 0.7885 | 0.1986 |
| g_SDSS  | 5.2891 | H (H - K) | 4.0677 | 5.4116 | 0.1409 |

Table 43: Target filter: r_SDSS, Reference facility: 2MASS

| F_Tar    | z  | F_Ref | Col     | alpha  | beta  | sigma |
|----------|----|-------|---------|--------|-------|-------|
| r_SDSS  | 0.0369 | J (J - H) | 2.9166 | 0.1908 | 0.0735 |
| r_SDSS  | 0.1149 | J (J - H) | 2.9703 | 0.3800 | 0.0923 |
| r_SDSS  | 0.2025 | J (J - H) | 2.8213 | 0.6158 | 0.1173 |
| r_SDSS  | 0.3021 | J (J - H) | 2.3209 | 0.7021 | 0.1417 |
| r_SDSS  | 0.4170 | J (J - H) | 2.6823 | 0.6899 | 0.1891 |
| r_SDSS  | 0.5519 | J (J - H) | 3.1169 | 0.6719 | 0.2074 |
| r_SDSS  | 0.7142 | J (J - H) | 3.6994 | 0.7299 | 0.1901 |
| r_SDSS  | 0.9152 | J (J - H) | 4.0776 | 0.7457 | 0.1629 |
| r_SDSS  | 1.1746 | J (J - H) | 4.6948 | 0.5704 | 0.1219 |
| r_SDSS  | 1.5293 | J (J - H) | 3.9132 | 0.5679 | 0.1337 |
| r_SDSS  | 2.0582 | J (J - H) | 2.5451 | 0.5734 | 0.1594 |
| r_SDSS  | 2.9779 | J (J - H) | 1.2331 | -0.6012 | 0.0983 |
| r_SDSS  | 5.2891 | H (H - K) | 2.5208 | 0.9475 | 0.0775 |
Table 44: Target filter: i_SDSS, Reference facility: 2MASS

| F_Tar | z | F_Ref | Col  | alpha | beta  | sigma |
|-------|---|-------|------|-------|-------|-------|
| i_SDSS | 0.0369 | J | (J - H) | 2.3941 | 0.0063 | 0.0373 |
| i_SDSS | 0.1149 | J | (J - H) | 2.3174 | 0.1755 | 0.0486 |
| i_SDSS | 0.2025 | J | (J - H) | 2.0075 | 0.3439 | 0.0569 |
| i_SDSS | 0.3021 | J | (J - H) | 1.6248 | 0.4074 | 0.0652 |
| i_SDSS | 0.4170 | J | (J - H) | 1.6682 | 0.4375 | 0.0981 |
| i_SDSS | 0.5519 | J | (J - H) | 1.6722 | 0.3816 | 0.1356 |
| i_SDSS | 0.7142 | J | (J - H) | 2.4444 | 0.1683 | 0.1377 |
| i_SDSS | 0.9152 | J | (J - H) | 3.0508 | 0.1727 | 0.0770 |
| i_SDSS | 1.1746 | J | (J - H) | 3.0298 | 0.5369 | 0.0699 |
| i_SDSS | 1.5293 | J | (J - H) | 2.8454 | 0.5541 | 0.0881 |
| i_SDSS | 2.0582 | J | (J - H) | 2.1479 | 0.5603 | 0.1239 |
| i_SDSS | 2.9779 | J | (J - H) | 0.9355 | -0.4710 | 0.0656 |
| i_SDSS | 5.2891 | H | (H - K) | 1.7722 | 0.2685 | 0.0467 |

Table 45: Target filter: z_SDSS, Reference facility: 2MASS

| F_Tar | z | F_Ref | Col  | alpha | beta  | sigma |
|-------|---|-------|------|-------|-------|-------|
| z_SDSS | 0.0369 | J | (J - H) | 1.5358 | -0.0649 | 0.0216 |
| z_SDSS | 0.1149 | J | (J - H) | 1.5476 | 0.0318 | 0.0317 |
| z_SDSS | 0.2025 | J | (J - H) | 1.4242 | 0.1539 | 0.0323 |
| z_SDSS | 0.3021 | J | (J - H) | 1.1390 | 0.2264 | 0.0236 |
| z_SDSS | 0.4170 | J | (J - H) | 1.0582 | 0.2302 | 0.0432 |
| z_SDSS | 0.5519 | J | (J - H) | 0.9744 | 0.1976 | 0.0663 |
| z_SDSS | 0.7142 | J | (J - H) | 1.2571 | 0.1512 | 0.0731 |
| z_SDSS | 0.9152 | J | (J - H) | 1.6388 | 0.0291 | 0.0574 |
| z_SDSS | 1.1746 | J | (J - H) | 2.0195 | -0.0277 | 0.0284 |
| z_SDSS | 1.5293 | J | (J - H) | 1.6540 | 0.4230 | 0.0572 |
| z_SDSS | 2.0582 | J | (J - H) | 1.4789 | 0.5460 | 0.0832 |
| z_SDSS | 2.9779 | J | (J - H) | 0.7152 | -0.3768 | 0.0496 |
| z_SDSS | 5.2891 | H | (H - K) | 0.9923 | 0.1002 | 0.0233 |

Table 46: Target filter: Z_VISTA, Reference facility: 2MASS

| F_Tar | z | F_Ref | Col  | alpha | beta  | sigma |
|-------|---|-------|------|-------|-------|-------|
| Z_VISTA | 0.0369 | J | (J - H) | 1.6336 | -0.0575 | 0.0250 |
| Z_VISTA | 0.1149 | J | (J - H) | 1.6246 | 0.0371 | 0.0323 |
| Z_VISTA | 0.2025 | J | (J - H) | 1.4929 | 0.1655 | 0.0337 |
| Z_VISTA | 0.3021 | J | (J - H) | 1.2017 | 0.2462 | 0.0266 |
| Z_VISTA | 0.4170 | J | (J - H) | 1.0960 | 0.2545 | 0.0476 |
| Z_VISTA | 0.5519 | J | (J - H) | 1.0069 | 0.2100 | 0.0720 |
| Z_VISTA | 0.7142 | J | (J - H) | 1.3638 | 0.1645 | 0.0787 |
| Z_VISTA | 0.9152 | J | (J - H) | 1.7307 | 0.0273 | 0.0630 |
| Z_VISTA | 1.1746 | J | (J - H) | 2.1929 | -0.0459 | 0.0363 |
| Z_VISTA | 1.5293 | J | (J - H) | 1.7497 | 0.5484 | 0.0629 |
| Z_VISTA | 2.0582 | J | (J - H) | 1.5773 | 0.5441 | 0.0872 |
| Z_VISTA | 2.9779 | J | (J - H) | 0.7281 | -0.3871 | 0.0504 |
| Z_VISTA | 5.2891 | H | (H - K) | 0.9946 | 0.1021 | 0.0222 |
Table 47: Target filter: Y\_VISTA, Reference facility: 2MASS

| F\_Tar | z  | F\_Ref | Col     | alpha   | beta   | sigma  |
|--------|----|--------|---------|---------|--------|--------|
| Y\_VISTA | 0.0369 | J      | (J - H) | 0.8261  | -0.0761| 0.0083 |
| Y\_VISTA | 0.1149 | J      | (J - H) | 0.9244  | -0.0274| 0.0175 |
| Y\_VISTA | 0.2025 | J      | (J - H) | 0.8273  | 0.0695 | 0.0245 |
| Y\_VISTA | 0.3021 | J      | (J - H) | 0.7077  | 0.0986 | 0.0117 |
| Y\_VISTA | 0.4170 | J      | (J - H) | 0.6811  | 0.1008 | 0.0156 |
| Y\_VISTA | 0.5519 | J      | (J - H) | 0.5823  | 0.1154 | 0.0297 |
| Y\_VISTA | 0.7142 | J      | (J - H) | 0.6521  | 0.0600 | 0.0357 |
| Y\_VISTA | 0.9152 | J      | (J - H) | 0.8839  | 0.0251 | 0.0265 |
| Y\_VISTA | 1.1746 | J      | (J - H) | 0.9618  | 0.0070 | 0.0171 |
| Y\_VISTA | 1.5293 | J      | (J - H) | 1.0409  | -0.0459| 0.0438 |
| Y\_VISTA | 2.0582 | J      | (J - H) | 0.7959  | 0.5420 | 0.0611 |
| Y\_VISTA | 2.9779 | J      | (J - H) | 0.5075  | -0.2658| 0.0342 |
| Y\_VISTA | 5.2891 | H      | (H - K) | 0.8419  | 0.0678 | 0.0225 |

Table 48: Target filter: J\_VISTA, Reference facility: 2MASS

| F\_Tar | z  | F\_Ref | Col     | alpha   | beta   | sigma  |
|--------|----|--------|---------|---------|--------|--------|
| J\_VISTA | 0.0369 | J      | (J - H) | -0.0613 | 0.0047 | 0.0007 |
| J\_VISTA | 0.1149 | J      | (J - H) | -0.0732 | 0.0062 | 0.0006 |
| J\_VISTA | 0.2025 | J      | (J - H) | -0.0814 | -0.0001| 0.0014 |
| J\_VISTA | 0.3021 | J      | (J - H) | -0.0583 | -0.0088| 0.0019 |
| J\_VISTA | 0.4170 | J      | (J - H) | -0.0491 | -0.0081| 0.0007 |
| J\_VISTA | 0.5519 | J      | (J - H) | -0.0591 | -0.0052| 0.0020 |
| J\_VISTA | 0.7142 | J      | (J - H) | -0.0480 | -0.0118| 0.0022 |
| J\_VISTA | 0.9152 | J      | (J - H) | -0.0551 | -0.0017| 0.0023 |
| J\_VISTA | 1.1746 | J      | (J - H) | -0.0884 | -0.0004| 0.0010 |
| J\_VISTA | 1.5293 | J      | (J - H) | -0.0718 | 0.0151 | 0.0011 |
| J\_VISTA | 2.0582 | J      | (J - H) | -0.0492 | -0.0528| 0.0044 |
| J\_VISTA | 2.9779 | J      | (J - H) | -0.0559 | 0.0297 | 0.0032 |
| J\_VISTA | 5.2891 | J      | (J - H) | -0.0810 | 0.0001 | 0.0006 |

Table 49: Target filter: H\_VISTA, Reference facility: 2MASS

| F\_Tar | z  | F\_Ref | Col     | alpha   | beta   | sigma  |
|--------|----|--------|---------|---------|--------|--------|
| H\_VISTA | 0.0369 | H      | (J - H) | -0.0015 | 0.0027 | 3e-04  |
| H\_VISTA | 0.1149 | H      | (J - H) | -0.0102 | -0.0008| 6e-04  |
| H\_VISTA | 0.2025 | H      | (H - K) | 0.0000  | 0.0003 | 5e-04  |
| H\_VISTA | 0.3021 | H      | (J - H) | 0.0011  | -0.0015| 5e-04  |
| H\_VISTA | 0.4170 | H      | (J - H) | -0.0024 | -0.0003| 1e-04  |
| H\_VISTA | 0.5519 | H      | (H - K) | 0.0006  | 0.0003 | 3e-04  |
| H\_VISTA | 0.7142 | H      | (H - K) | -0.0114 | 0.0020 | 3e-04  |
| H\_VISTA | 0.9152 | H      | (H - K) | 0.0025  | -0.0009| 4e-04  |
| H\_VISTA | 1.1746 | H      | (J - H) | -0.0035 | 0.0005 | 4e-04  |
| H\_VISTA | 1.5293 | H      | (J - H) | -0.0031 | -0.0019| 2e-04  |
| H\_VISTA | 2.0582 | H      | (J - H) | -0.0045 | 0.0029 | 4e-04  |
| H\_VISTA | 2.9779 | H      | (J - H) | -0.0031 | 0.0039 | 9e-04  |
| H\_VISTA | 5.2891 | H      | (H - K) | 0.0022  | 0.0005 | 3e-04  |
Table 50: Target filter: Ks_VISTA, Reference facility: 2MASS

| F_Tar | z   | F_Ref | Col       | alpha   | beta   | sigma   |
|-------|-----|-------|-----------|---------|--------|---------|
| Ks_VISTA | 0.0369 | K     | (H - K)   | 0.0121  | -0.0004 | 3e-04   |
| Ks_VISTA | 0.1149 | K     | (H - K)   | 0.0038  | -0.0027 | 2e-04   |
| Ks_VISTA | 0.2025 | K     | (H - K)   | 0.0068  | -0.0019 | 1e-04   |
| Ks_VISTA | 0.3021 | K     | (H - K)   | 0.0111  | -0.0007 | 2e-04   |
| Ks_VISTA | 0.4170 | K     | (H - K)   | 0.0124  | 0.0004  | 2e-04   |
| Ks_VISTA | 0.5519 | K     | (H - K)   | 0.0088  | 0.0005  | 1e-04   |
| Ks_VISTA | 0.7142 | K     | (H - K)   | 0.0105  | 0.0006  | 1e-04   |
| Ks_VISTA | 0.9152 | K     | (H - K)   | 0.0115  | -0.0005 | 2e-04   |
| Ks_VISTA | 1.1746 | K     | (H - K)   | 0.0112  | -0.0007 | 2e-04   |
| Ks_VISTA | 1.5293 | K     | (H - K)   | 0.0100  | 0.0000  | 1e-04   |
| Ks_VISTA | 2.0582 | K     | (H - K)   | 0.0088  | 0.0023  | 2e-04   |
| Ks_VISTA | 2.9779 | K     | (H - K)   | 0.0077  | 0.0007  | 2e-04   |
| Ks_VISTA | 5.2891 | K     | (H - K)   | 0.0105  | -0.0006 | 1e-04   |

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Table 51: Target filter: u_SDSS, Reference facility: JWST

| F_Tar | z   | F_Ref | Col       | alpha   | beta   | sigma   |
|-------|-----|-------|-----------|---------|--------|---------|
| u_SDSS | 0.0369 | F090  | (F090 - F115) | 3.0918  | 1.7496 | 0.2998  |
| u_SDSS | 0.1149 | F090  | (F090 - F115) | 3.2990  | 1.6888 | 0.3698  |
| u_SDSS | 0.2025 | F090  | (F090 - F115) | 5.0877  | 1.4110 | 0.3986  |
| u_SDSS | 0.3021 | F115  | (F115 - F150) | 5.0707  | 2.3069 | 0.5156  |
| u_SDSS | 0.4170 | F070  | (F070 - F090) | 4.8876  | 0.4260 | 0.2026  |
| u_SDSS | 0.5519 | F070  | (F070 - F090) | 4.0374  | 0.5369 | 0.2281  |
| u_SDSS | 0.7142 | F070  | (F070 - F090) | 3.0154  | 0.5407 | 0.2671  |
| u_SDSS | 0.9152 | F070  | (F070 - F090) | 2.7481  | -0.6150 | 0.2665 |
| u_SDSS | 1.1746 | F070  | (F070 - F090) | 2.5063  | -1.3863 | 0.2853 |
| u_SDSS | 1.5293 | F070  | (F070 - F090) | 1.8159  | -0.2991 | 0.1985 |
| u_SDSS | 2.0582 | F070  | (F070 - F090) | 2.8034  | 0.1228 | 0.2266 |
| u_SDSS | 2.9779 | F115  | (F115 - F150) | 2.8056  | 1.3888 | 0.3180 |
| u_SDSS | 5.2891 | F070  | (F070 - F090) | 2.5052  | 5.9694 | 0.1701 |

Table 52: Target filter: g_SDSS, Reference facility: JWST

| F_Tar | z   | F_Ref | Col       | alpha   | beta   | sigma   |
|-------|-----|-------|-----------|---------|--------|---------|
| g_SDSS | 0.0369 | F070  | (F070 - F090) | 1.8219  | 0.2173 | 0.1011  |
| g_SDSS | 0.1149 | F090  | (F090 - F115) | 2.2318  | 0.6873 | 0.2193  |
| g_SDSS | 0.2025 | F070  | (F070 - F090) | 2.7423  | 0.1201 | 0.0412  |
| g_SDSS | 0.3021 | F070  | (F070 - F090) | 2.5861  | 0.2486 | 0.0636  |
| g_SDSS | 0.4170 | F070  | (F070 - F090) | 2.0913  | 0.5475 | 0.0688  |
| g_SDSS | 0.5519 | F070  | (F070 - F090) | 1.9640  | 0.6423 | 0.0818  |
| g_SDSS | 0.7142 | F070  | (F070 - F090) | 1.7833  | 0.5888 | 0.1203  |
| g_SDSS | 0.9152 | F070  | (F070 - F090) | 1.8657  | -0.3218 | 0.1478 |
| g_SDSS | 1.1746 | F070  | (F070 - F090) | 1.6073  | -0.8864 | 0.1408 |
| g_SDSS | 1.5293 | F070  | (F070 - F090) | 1.0356  | -0.1699 | 0.0717 |
| g_SDSS | 2.0582 | F070  | (F070 - F090) | 1.1702  | 0.0162 | 0.0577  |
| g_SDSS | 2.9779 | F115  | (F115 - F150) | 1.8587  | -0.3490 | 0.1645 |
Table 53: Target filter: r_SDSS, Reference facility: JWST

| F_Tar | z   | F_Ref | Col          | alpha | beta  | sigma |
|-------|-----|-------|--------------|-------|-------|-------|
| r_SDSS 0.0369 | F070 | (F070 - F090) | 0.4230 | 0.0575 | 0.0221 |
| r_SDSS 0.1149 | F070 | (F070 - F090) | 0.6046 | 0.0152 | 0.0149 |
| r_SDSS 0.2025 | F070 | (F070 - F090) | 0.6621 | 0.0260 | 0.0120 |
| r_SDSS 0.3021 | F070 | (F070 - F090) | 0.7755 | -0.0334 | 0.0074 |
| r_SDSS 0.4170 | F070 | (F070 - F090) | 0.7855 | -0.0747 | 0.0156 |
| r_SDSS 0.5519 | F070 | (F070 - F090) | 0.7092 | 0.0645 | 0.0444 |
| r_SDSS 0.7142 | F070 | (F070 - F090) | 0.4458 | 0.3692 | 0.0314 |
| r_SDSS 0.9152 | F070 | (F070 - F090) | 0.4703 | 0.1340 | 0.0469 |
| r_SDSS 1.1746 | F070 | (F070 - F090) | 0.6691 | -0.0894 | 0.0444 |
| r_SDSS 1.5293 | F070 | (F070 - F090) | 0.4410 | -0.0747 | 0.0246 |
| r_SDSS 2.0582 | F070 | (F070 - F090) | 0.2822 | 0.0026 | 0.0086 |
| r_SDSS 2.9779 | F070 | (F070 - F090) | 0.6143 | -0.0034 | 0.0109 |
| r_SDSS 5.2891 | F070 | (F070 - F090) | 0.4520 | 0.4734 | 0.0142 |

Table 54: Target filter: i_SDSS, Reference facility: JWST

| F_Tar | z   | F_Ref | Col          | alpha | beta  | sigma |
|-------|-----|-------|--------------|-------|-------|-------|
| i_SDSS 0.0369 | F070 | (F070 - F090) | -0.2059 | -0.0321 | 0.0085 |
| i_SDSS 0.1149 | F070 | (F070 - F090) | -0.2466 | -0.0107 | 0.0086 |
| i_SDSS 0.2025 | F070 | (F070 - F090) | -0.3198 | 0.0093 | 0.0022 |
| i_SDSS 0.3021 | F070 | (F070 - F090) | -0.3093 | -0.0116 | 0.0025 |
| i_SDSS 0.4170 | F070 | (F070 - F090) | -0.3161 | 0.0052 | 0.0036 |
| i_SDSS 0.5519 | F070 | (F070 - F090) | -0.3347 | 0.0195 | 0.0086 |
| i_SDSS 0.7142 | F070 | (F070 - F090) | -0.2667 | -0.0894 | 0.0116 |
| i_SDSS 0.9152 | F070 | (F070 - F090) | -0.2086 | -0.1585 | 0.0163 |
| i_SDSS 1.1746 | F070 | (F070 - F090) | -0.3049 | 0.1399 | 0.0118 |
| i_SDSS 1.5293 | F070 | (F070 - F090) | -0.2517 | 0.0427 | 0.0085 |
| i_SDSS 2.0582 | F070 | (F070 - F090) | -0.1807 | 0.0008 | 0.0050 |
| i_SDSS 2.9779 | F070 | (F070 - F090) | -0.3273 | -0.0010 | 0.0038 |
| i_SDSS 5.2891 | F070 | (F070 - F090) | -0.2720 | -0.0206 | 0.0048 |

Table 55: Target filter: z_SDSS, Reference facility: JWST

| F_Tar | z   | F_Ref | Col          | alpha | beta  | sigma |
|-------|-----|-------|--------------|-------|-------|-------|
| z_SDSS 0.0369 | F090 | (F070 - F090) | 0.0084 | 0.0021 | 0.0023 |
| z_SDSS 0.1149 | F090 | (F090 - F115) | 0.0103 | -0.0027 | 0.0009 |
| z_SDSS 0.2025 | F090 | (F070 - F090) | 0.0355 | -0.0125 | 0.0024 |
| z_SDSS 0.3021 | F090 | (F070 - F090) | 0.0066 | 0.0082 | 0.0005 |
| z_SDSS 0.4170 | F090 | (F070 - F090) | 0.0134 | 0.0000 | 0.0005 |
| z_SDSS 0.5519 | F090 | (F070 - F090) | -0.0010 | 0.0031 | 0.0021 |
| z_SDSS 0.7142 | F090 | (F070 - F090) | 0.0210 | 0.0030 | 0.0013 |
| z_SDSS 0.9152 | F090 | (F090 - F115) | 0.0018 | -0.0021 | 0.0039 |
Table 56: Target filter: Z\_VISTA, Reference facility: JWST

| F\_Tar | z    | F\_Ref | Col         | alpha  | beta   | sigma  |
|--------|------|--------|-------------|--------|--------|--------|
| Z\_VISTA 0.0369 | F090 | (F070 - F090) | 0.0821 | 0.0007 | 0.0074 |
| Z\_VISTA 0.1149 | F090 | (F090 - F115) | 0.0700 | -0.0005 | 0.0024 |
| Z\_VISTA 0.2025 | F090 | (F090 - F090) | 0.1005 | -0.0180 | 0.0037 |
| Z\_VISTA 0.3021 | F090 | (F090 - F090) | 0.0707 | 0.0087 | 0.0024 |
| Z\_VISTA 0.4170 | F090 | (F090 - F090) | 0.0616 | 0.0099 | 0.0013 |
| Z\_VISTA 0.5519 | F090 | (F090 - F090) | 0.0413 | 0.0043 | 0.0043 |
| Z\_VISTA 0.7142 | F090 | (F070 - F090) | 0.0844 | 0.0066 | 0.0019 |
| Z\_VISTA 0.9152 | F090 | (F070 - F090) | 0.0487 | -0.0214 | 0.0090 |
| Z\_VISTA 1.1746 | F090 | (F070 - F090) | 0.1519 | -0.1266 | 0.0210 |
| Z\_VISTA 1.5293 | F090 | (F090 - F115) | 0.0674 | 0.1463 | 0.0197 |
| Z\_VISTA 2.0582 | F090 | (F090 - F115) | 0.1349 | -0.0461 | 0.0093 |
| Z\_VISTA 2.9779 | F090 | (F090 - F115) | 0.0303 | -0.0080 | 0.0040 |
| Z\_VISTA 5.2891 | F090 | (F070 - F090) | -0.0248 | 0.0054 | 0.0020 |

Table 57: Target filter: Y\_VISTA, Reference facility: JWST

| F\_Tar | z    | F\_Ref | Col         | alpha  | beta   | sigma  |
|--------|------|--------|-------------|--------|--------|--------|
| Y\_VISTA 0.0369 | F115 | (F090 - F115) | 0.4336 | -0.0319 | 0.0047 |
| Y\_VISTA 0.1149 | F090 | (F070 - F090) | -0.4279 | 0.0202 | 0.0271 |
| Y\_VISTA 0.2025 | F090 | (F070 - F090) | -0.4581 | 0.0341 | 0.0167 |
| Y\_VISTA 0.3021 | F090 | (F070 - F090) | -0.4271 | 0.0106 | 0.0156 |
| Y\_VISTA 0.4170 | F090 | (F070 - F090) | -0.3633 | -0.0154 | 0.0068 |
| Y\_VISTA 0.5519 | F090 | (F070 - F090) | -0.3630 | 0.0113 | 0.0051 |
| Y\_VISTA 0.7142 | F090 | (F070 - F090) | -0.3507 | -0.0298 | 0.0137 |
| Y\_VISTA 0.9152 | F115 | (F090 - F115) | 0.4362 | 0.0060 | 0.0038 |
| Y\_VISTA 1.1746 | F115 | (F090 - F115) | 0.3932 | 0.0005 | 0.0160 |
| Y\_VISTA 1.5293 | F090 | (F070 - F090) | -0.3904 | -0.3489 | 0.0317 |
| Y\_VISTA 2.0582 | F115 | (F090 - F115) | 0.4816 | 0.1729 | 0.0184 |
| Y\_VISTA 2.9779 | F115 | (F115 - F150) | 0.3274 | -0.0944 | 0.0165 |
| Y\_VISTA 5.2891 | F090 | (F070 - F090) | -0.1554 | 0.0041 | 0.0060 |

Table 58: Target filter: J\_VISTA, Reference facility: JWST

| F\_Tar | z    | F\_Ref | Col         | alpha  | beta   | sigma  |
|--------|------|--------|-------------|--------|--------|--------|
| J\_VISTA 0.0369 | F115 | (F090 - F115) | -0.2647 | 0.0179 | 0.0049 |
| J\_VISTA 0.1149 | F115 | (F090 - F115) | -0.4279 | 0.0202 | 0.0271 |
| J\_VISTA 0.2025 | F115 | (F090 - F115) | -0.3641 | 0.0411 | 0.0055 |
| J\_VISTA 0.3021 | F115 | (F090 - F115) | -0.3331 | 0.0221 | 0.0122 |
Table 59: Target filter: H_VISTA, Reference facility: JWST

| F_Tar  | z    | F_Ref | Col      | alpha  | beta  | sigma |
|--------|------|-------|----------|--------|-------|-------|
| J_VISTA | 0.4170 | F115  | (F090 - F115) | -0.2889 | 0.0143 | 0.0113 |
| J_VISTA | 0.5519 | F115  | (F090 - F115) | -0.3030 | 0.0128 | 0.0084 |
| J_VISTA | 0.7142 | F115  | (F090 - F115) | -0.2714 | -0.0042 | 0.0050 |
| J_VISTA | 0.9152 | F115  | (F090 - F115) | -0.2441 | -0.0100 | 0.0029 |
| J_VISTA | 1.1746 | F115  | (F090 - F115) | -0.2611 | -0.0189 | 0.0081 |
| J_VISTA | 1.5293 | F115  | (F090 - F115) | -0.2929 | 0.1712 | 0.0144 |
| J_VISTA | 2.0582 | F115  | (F090 - F115) | -0.2587 | -0.1645 | 0.0134 |
| J_VISTA | 2.9779 | F115  | (F115 - F150) | -0.2941 | 0.0881 | 0.0114 |
| J_VISTA | 5.2891 | F150  | (F150 - F200) | -0.1929 | 0.0043 | 0.0020 |

Table 60: Target filter: Ks_VISTA, Reference facility: JWST

| F_Tar  | z    | F_Ref | Col      | alpha  | beta  | sigma |
|--------|------|-------|----------|--------|-------|-------|
| Ks_VISTA | 0.0369 | F200  | (F150 - F200) | -0.1639 | 0.0879 | 0.0050 |
| Ks_VISTA | 0.1149 | F200  | (F150 - F200) | -0.1054 | 0.0889 | 0.0064 |
| Ks_VISTA | 0.2025 | F200  | (F150 - F200) | -0.2298 | 0.0499 | 0.0079 |
| Ks_VISTA | 0.3021 | F200  | (F150 - F200) | -0.3297 | 0.0063 | 0.0086 |
| Ks_VISTA | 0.4170 | F200  | (F150 - F200) | -0.2586 | -0.0203 | 0.0043 |
| Ks_VISTA | 0.5519 | F200  | (F150 - F200) | -0.2254 | -0.0157 | 0.0059 |
| Ks_VISTA | 0.7142 | F200  | (F150 - F200) | -0.2829 | 0.0036 | 0.0040 |
| Ks_VISTA | 0.9152 | F200  | (F150 - F200) | -0.3328 | 0.0457 | 0.0044 |
| Ks_VISTA | 1.1746 | F200  | (F150 - F200) | -0.2537 | 0.0174 | 0.0065 |
| Ks_VISTA | 1.5293 | F200  | (F150 - F200) | -0.2502 | 0.0169 | 0.0097 |
| Ks_VISTA | 2.0582 | F200  | (F150 - F200) | -0.2027 | -0.0048 | 0.0036 |
| Ks_VISTA | 2.9779 | F200  | (F150 - F200) | -0.1967 | 0.0442 | 0.0064 |
| Ks_VISTA | 5.2891 | F200  | (F150 - F200) | -0.4371 | 0.0109 | 0.0039 |

Euclid
Table 61: Target filter: u_SDSS, Reference facility: Euclid

| F_Tar  | z    | F_Ref | Col   | alpha | beta  | sigma |
|--------|------|-------|-------|-------|-------|-------|
| u_SDSS | 0.0369 VIS | (VIS - Y) | 1.8930 | 1.1486 | 0.2098 |
| u_SDSS | 0.1149 VIS | (VIS - Y) | 2.4309 | 0.9321 | 0.2146 |
| u_SDSS | 0.2025 VIS | (VIS - Y) | 3.1629 | 0.6199 | 0.1910 |
| u_SDSS | 0.3021 VIS | (VIS - Y) | 3.2241 | 0.5443 | 0.1941 |
| u_SDSS | 0.4170 VIS | (VIS - Y) | 3.0751 | 0.4865 | 0.2348 |
| u_SDSS | 0.5519 VIS | (VIS - Y) | 2.9139 | 0.2088 | 0.2555 |
| u_SDSS | 0.7142 VIS | (VIS - Y) | 2.4940 | -0.0238 | 0.2523 |
| u_SDSS | 0.9152 VIS | (VIS - Y) | 2.0742 | -0.2815 | 0.2411 |
| u_SDSS | 1.1746 VIS | (VIS - Y) | 1.6525 | -0.5997 | 0.2664 |
| u_SDSS | 1.5293 VIS | (VIS - Y) | 1.2413 | -0.7173 | 0.2428 |
| u_SDSS | 2.0582 VIS | (VIS - Y) | 1.5371 | -0.0648 | 0.2649 |
| u_SDSS | 2.9779 VIS | (VIS - Y) | 2.9390 | 2.0688 | 0.2068 |
| u_SDSS | 5.2891 VIS | (VIS - Y) | 2.8864 | 4.9942 | 0.1542 |

Table 62: Target filter: g_SDSS, Reference facility: Euclid

| F_Tar  | z    | F_Ref | Col   | alpha | beta  | sigma |
|--------|------|-------|-------|-------|-------|-------|
| g_SDSS | 0.0369 VIS | (VIS - Y) | 0.9950 | 0.3138 | 0.1154 |
| g_SDSS | 0.1149 VIS | (VIS - Y) | 1.3859 | 0.1808 | 0.1035 |
| g_SDSS | 0.2025 VIS | (VIS - Y) | 1.6931 | 0.1469 | 0.0554 |
| g_SDSS | 0.3021 VIS | (VIS - Y) | 1.5509 | 0.3219 | 0.0494 |
| g_SDSS | 0.4170 VIS | (VIS - Y) | 1.3247 | 0.5666 | 0.0676 |
| g_SDSS | 0.5519 VIS | (VIS - Y) | 1.4627 | 0.4289 | 0.0833 |
| g_SDSS | 0.7142 VIS | (VIS - Y) | 1.5288 | 0.1862 | 0.1033 |
| g_SDSS | 0.9152 VIS | (VIS - Y) | 1.4408 | -0.0936 | 0.1255 |
| g_SDSS | 1.1746 VIS | (VIS - Y) | 1.0698 | -0.3400 | 0.1309 |
| g_SDSS | 1.5293 VIS | (VIS - Y) | 0.7440 | -0.4359 | 0.1042 |
| g_SDSS | 2.0582 VIS | (VIS - Y) | 0.6668 | -0.0688 | 0.0829 |
| g_SDSS | 2.9779 VIS | (VIS - Y) | 1.4684 | 0.1090 | 0.0724 |
| g_SDSS | 5.2891 VIS | (VIS - Y) | 2.2071 | 3.7757 | 0.0934 |

Table 63: Target filter: r_SDSS, Reference facility: Euclid

| F_Tar  | z    | F_Ref | Col   | alpha | beta  | sigma |
|--------|------|-------|-------|-------|-------|-------|
| r_SDSS | 0.0369 VIS | (VIS - Y) | 0.2580 | 0.0618 | 0.0215 |
| r_SDSS | 0.1149 VIS | (VIS - Y) | 0.3261 | 0.0340 | 0.0234 |
| r_SDSS | 0.2025 VIS | (VIS - Y) | 0.3920 | 0.0243 | 0.0175 |
| r_SDSS | 0.3021 VIS | (VIS - Y) | 0.4110 | 0.0069 | 0.0182 |
| r_SDSS | 0.4170 VIS | (VIS - Y) | 0.4800 | -0.0629 | 0.0136 |
| r_SDSS | 0.5519 VIS | (VIS - Y) | 0.5707 | -0.0724 | 0.0342 |
| r_SDSS | 0.7142 VIS | (VIS - Y) | 0.4721 | 0.1474 | 0.0286 |
| r_SDSS | 0.9152 VIS | (VIS - Y) | 0.4451 | 0.1917 | 0.0330 |
| r_SDSS | 1.1746 VIS | (VIS - Y) | 0.4733 | -0.0851 | 0.0369 |
| r_SDSS | 1.5293 VIS | (VIS - Y) | 0.3567 | -0.2168 | 0.0453 |
| r_SDSS | 2.0582 VIS | (VIS - Y) | 0.1943 | -0.0269 | 0.0176 |
| r_SDSS | 2.9779 VIS | (VIS - Y) | 0.3310 | 0.0024 | 0.0125 |
| r_SDSS | 5.2891 VIS | (VIS - Y) | 0.7438 | 0.0325 | 0.0120 |
Table 64: Target filter: i_SDSS, Reference facility: Euclid

| F_Tar  | z   | F_Ref | Col     | alpha | beta  | sigma |
|--------|-----|-------|---------|-------|-------|-------|
| i_SDSS| 0.0369 | VIS   | (VIS - Y) | -0.0771 | -0.0683 | 0.0163 |
| i_SDSS| 0.1149 | VIS   | (VIS - Y) | -0.1269 | -0.0402 | 0.0165 |
| i_SDSS| 0.2025 | VIS   | (VIS - Y) | -0.2012 | -0.0137 | 0.0106 |
| i_SDSS| 0.3021 | VIS   | (VIS - Y) | -0.2298 | -0.0082 | 0.0077 |
| i_SDSS| 0.4170 | VIS   | (VIS - Y) | -0.2340 | 0.0113  | 0.0050 |
| i_SDSS| 0.5519 | VIS   | (VIS - Y) | -0.1905 | -0.0439 | 0.0152 |
| i_SDSS| 0.7142 | VIS   | (VIS - Y) | -0.0778 | -0.2219 | 0.0172 |
| i_SDSS| 0.9152 | VIS   | (VIS - Y) | -0.0419 | -0.1820 | 0.0264 |
| i_SDSS| 1.1746 | VIS   | (VIS - Y) | -0.1481 | 0.1579  | 0.0129 |
| i_SDSS| 1.5293 | VIS   | (VIS - Y) | -0.0990 | 0.0496  | 0.0073 |
| i_SDSS| 2.0582 | VIS   | (VIS - Y) | -0.0578 | 0.0028  | 0.0052 |
| i_SDSS| 2.9779 | VIS   | (VIS - Y) | -0.1679 | -0.0059 | 0.0052 |
| i_SDSS| 5.2891 | VIS   | (VIS - Y) | 0.0017  | -0.2802 | 0.0076 |

Table 65: Target filter: z_SDSS, Reference facility: Euclid

| F_Tar  | z   | F_Ref | Col     | alpha | beta  | sigma |
|--------|-----|-------|---------|-------|-------|-------|
| z_SDSS| 0.0369 | Y     | (VIS - Y) | 0.4607 | -0.0732 | 0.0196 |
| z_SDSS| 0.1149 | Y     | (VIS - Y) | 0.4269 | -0.0593 | 0.0239 |
| z_SDSS| 0.2025 | Y     | (VIS - Y) | 0.4023 | -0.0468 | 0.0220 |
| z_SDSS| 0.3021 | Y     | (VIS - Y) | 0.3592 | -0.0088 | 0.0170 |
| z_SDSS| 0.4170 | Y     | (VIS - Y) | 0.3331 | 0.0020  | 0.0081 |
| z_SDSS| 0.5519 | Y     | (VIS - Y) | 0.3316 | -0.0175 | 0.0062 |
| z_SDSS| 0.7142 | Y     | (VIS - Y) | 0.3687 | -0.0390 | 0.0086 |
| z_SDSS| 0.9152 | Y     | (VIS - Y) | 0.4118 | -0.1342 | 0.0170 |
| z_SDSS| 1.1746 | Y     | (VIS - Y) | 0.4632 | -0.2295 | 0.0276 |
| z_SDSS| 1.5293 | Y     | (VIS - Y) | 0.3950 | 0.2286  | 0.0219 |
| z_SDSS| 2.0582 | VIS   | (VIS - Y) | -0.4692 | 0.0547  | 0.0160 |
| z_SDSS| 2.9779 | Y     | (VIS - Y) | 0.4764 | -0.0164 | 0.0091 |
| z_SDSS| 5.2891 | Y     | (VIS - Y) | 0.2368 | -0.0710 | 0.0040 |

Table 66: Target filter: Z_VISTA, Reference facility: Euclid

| F_Tar  | z   | F_Ref | Col     | alpha | beta  | sigma |
|--------|-----|-------|---------|-------|-------|-------|
| Z_VISTA| 0.0369 | VIS   | (VIS - Y) | -0.4909 | -0.0722 | 0.0237 |
| Z_VISTA| 0.1149 | Y     | (VIS - Y) | 0.4658 | -0.0646 | 0.0249 |
| Z_VISTA| 0.2025 | Y     | (VIS - Y) | 0.4438 | -0.0517 | 0.0221 |
| Z_VISTA| 0.3021 | Y     | (VIS - Y) | 0.4003 | -0.0075 | 0.0182 |
| Z_VISTA| 0.4170 | Y     | (VIS - Y) | 0.3639 | 0.0123  | 0.0072 |
| Z_VISTA| 0.5519 | Y     | (VIS - Y) | 0.3615 | -0.0188 | 0.0082 |
| Z_VISTA| 0.7142 | Y     | (VIS - Y) | 0.4180 | -0.0435 | 0.0091 |
| Z_VISTA| 0.9152 | Y     | (VIS - Y) | 0.4511 | -0.1510 | 0.0205 |
| Z_VISTA| 1.1746 | VIS   | (VIS - Y) | -0.4733 | -0.2754 | 0.0360 |
| Z_VISTA| 1.5293 | Y     | (VIS - Y) | 0.4402 | 0.3246  | 0.0281 |
| Z_VISTA| 2.0582 | VIS   | (VIS - Y) | -0.4105 | 0.0439  | 0.0155 |
| Z_VISTA| 2.9779 | Y     | (VIS - Y) | 0.4965 | -0.0205 | 0.0110 |
| Z_VISTA| 5.2891 | Y     | (VIS - Y) | 0.2368 | -0.0691 | 0.0052 |
Table 67: Target filter: Y_VISTA, Reference facility: Euclid

| F_Tar | z   | F_Ref | Col          | alpha | beta  | sigma |
|-------|-----|-------|--------------|-------|-------|-------|
| Y_VISTA | 0.0369 | Y    | (VIS - Y)    | 0.1048 | -0.0365 | 0.0025 |
| Y_VISTA | 0.1149 | Y    | (VIS - Y)    | 0.1163 | -0.0343 | 0.0073 |
| Y_VISTA | 0.2025 | Y    | (VIS - Y)    | 0.0746 | 0.0001  | 0.0120 |
| Y_VISTA | 0.3021 | Y    | (VIS - Y)    | 0.0802 | -0.0119 | 0.0091 |
| Y_VISTA | 0.4170 | Y    | (VIS - Y)    | 0.0862 | -0.0141 | 0.0064 |
| Y_VISTA | 0.5519 | Y    | (VIS - Y)    | 0.0710 | 0.0144  | 0.0018 |
| Y_VISTA | 0.7142 | Y    | (VIS - Y)    | 0.0755 | -0.0218 | 0.0034 |
| Y_VISTA | 0.9152 | Y    | (VIS - Y)    | 0.1015 | -0.0237 | 0.0038 |
| Y_VISTA | 1.1746 | Y    | (VIS - Y)    | 0.0770 | -0.0260 | 0.0086 |
| Y_VISTA | 1.5293 | Y    | (VIS - Y)    | 0.1240 | -0.0705 | 0.0202 |
| Y_VISTA | 2.0582 | Y    | (VIS - Y)    | 0.1296 | 0.1100  | 0.0144 |
| Y_VISTA | 2.9779 | Y    | (VIS - Y)    | 0.1421 | -0.0043 | 0.0034 |
| Y_VISTA | 5.2891 | Y    | (VIS - Y)    | 0.0980 | -0.0350 | 0.0024 |

Table 68: Target filter: J_VISTA, Reference facility: Euclid

| F_Tar | z   | F_Ref | Col          | alpha | beta  | sigma |
|-------|-----|-------|--------------|-------|-------|-------|
| J_VISTA | 0.0369 | J    | (Blue - J)   | 0.2642 | 0.0131 | 0.0041 |
| J_VISTA | 0.1149 | J    | (Blue - J)   | 0.3064 | 0.0015 | 0.0027 |
| J_VISTA | 0.2025 | J    | (Blue - J)   | 0.3058 | -0.0166 | 0.0030 |
| J_VISTA | 0.3021 | Y    | (VIS - Y)    | -0.2443 | 0.0322 | 0.0359 |
| J_VISTA | 0.4170 | Y    | (VIS - Y)    | -0.2413 | 0.0307 | 0.0283 |
| J_VISTA | 0.5519 | Y    | (VIS - Y)    | -0.2641 | 0.0338 | 0.0175 |
| J_VISTA | 0.7142 | Y    | (VIS - Y)    | -0.2466 | 0.0222 | 0.0088 |
| J_VISTA | 0.9152 | Y    | (VIS - Y)    | -0.2717 | 0.0834 | 0.0136 |
| J_VISTA | 1.1746 | J    | (Blue - J)   | 0.2838 | -0.0026 | 0.0020 |
| J_VISTA | 1.5293 | J    | (Blue - J)   | 0.3167 | 0.0172 | 0.0057 |
| J_VISTA | 2.0582 | J    | (Blue - J)   | 0.3798 | -0.1505 | 0.0175 |
| J_VISTA | 2.9779 | J    | (Blue - J)   | 0.4139 | 0.0519 | 0.0087 |
| J_VISTA | 5.2891 | J    | (Blue - J)   | 0.2551 | 0.0026 | 0.0019 |

Table 69: Target filter: H_VISTA, Reference facility: Euclid

| F_Tar | z   | F_Ref | Col          | alpha | beta  | sigma |
|-------|-----|-------|--------------|-------|-------|-------|
| H_VISTA | 0.0369 | H    | (Red - H)    | 0.3566 | -0.0312 | 0.0044 |
| H_VISTA | 0.1149 | Red  | (Red - H)    | -0.4877 | -0.0059 | 0.0051 |
| H_VISTA | 0.2025 | H    | (Red - H)    | 0.4451 | 0.0113  | 0.0029 |
| H_VISTA | 0.3021 | H    | (Red - H)    | 0.3365 | 0.0095  | 0.0021 |
| H_VISTA | 0.4170 | H    | (Red - H)    | 0.3610 | 0.0105  | 0.0028 |
| H_VISTA | 0.5519 | H    | (Red - H)    | 0.3971 | -0.0103 | 0.0017 |
| H_VISTA | 0.7142 | H    | (Red - H)    | 0.4506 | -0.0222 | 0.0017 |
| H_VISTA | 0.9152 | H    | (Red - H)    | 0.4104 | -0.0082 | 0.0040 |
| H_VISTA | 1.1746 | H    | (Red - H)    | 0.4156 | -0.0124 | 0.0046 |
| H_VISTA | 1.5293 | H    | (Red - H)    | 0.3716 | 0.0005  | 0.0026 |
| H_VISTA | 2.0582 | H    | (Red - H)    | 0.3576 | 0.0113  | 0.0016 |
| H_VISTA | 2.9779 | H    | (Red - H)    | 0.4237 | -0.1030 | 0.0117 |
| H_VISTA | 5.2891 | Red  | (Red - H)    | -0.3445 | 0.0037 | 0.0020 |
### Table 70: Target filter: Ks_VISTA, Reference facility: Euclid

| F_Tar   | z   | F_Ref   | Col     | alpha   | beta   | sigma |
|---------|-----|---------|---------|---------|--------|-------|
| Ks_VISTA | 0.0369 | H      | (Red - H) | -0.8424 | 0.2095 | 0.0159 |
| Ks_VISTA | 0.1149 | H      | (Red - H) | -0.8602 | 0.1538 | 0.0163 |
| Ks_VISTA | 0.2025 | Y      | (VIS - Y) | -1.0564 | 0.3985 | 0.1074 |
| Ks_VISTA | 0.3021 | Y      | (VIS - Y) | -0.9793 | 0.3207 | 0.1257 |
| Ks_VISTA | 0.4170 | Y      | (VIS - Y) | -0.9077 | 0.3065 | 0.1213 |
| Ks_VISTA | 0.5519 | Y      | (VIS - Y) | -0.9154 | 0.3447 | 0.1146 |
| Ks_VISTA | 0.7142 | Y      | (VIS - Y) | -0.8945 | 0.3884 | 0.0960 |
| Ks_VISTA | 0.9152 | Y      | (VIS - Y) | -0.9026 | 0.4397 | 0.0784 |
| Ks_VISTA | 1.1746 | Y      | (VIS - Y) | -0.8612 | 0.4364 | 0.0621 |
| Ks_VISTA | 1.5293 | Y      | (VIS - Y) | -0.9347 | 0.6271 | 0.0992 |
| Ks_VISTA | 2.6582 | H      | (Red - H) | -0.9739 | -0.0276 | 0.0050 |
| Ks_VISTA | 2.9779 | H      | (Red - H) | -1.1354 | 0.2680 | 0.0201 |
| Ks_VISTA | 5.2891 | Y      | (VIS - Y) | -1.6132 | 0.7389 | 0.0358 |

### WFIRST

### Table 71: Target filter: u_SDSS, Reference facility: WFIRST

| F_Tar   | z   | F_Ref   | Col     | alpha   | beta   | sigma |
|---------|-----|---------|---------|---------|--------|-------|
| u_SDSS | 0.0369 | R062 | (R062 - Z087) | 2.6570 | 0.6463 | 0.1046 |
| u_SDSS | 0.1149 | R062 | (R062 - Z087) | 2.8691 | 0.5599 | 0.0946 |
| u_SDSS | 0.2025 | R062 | (R062 - Z087) | 3.1221 | 0.4672 | 0.1195 |
| u_SDSS | 0.3021 | R062 | (R062 - Z087) | 3.1274 | 0.3830 | 0.1431 |
| u_SDSS | 0.4170 | R062 | (R062 - Z087) | 2.9865 | 0.2459 | 0.1929 |
| u_SDSS | 0.5519 | R062 | (R062 - Z087) | 2.7556 | -0.0477 | 0.2268 |
| u_SDSS | 0.7142 | R062 | (R062 - Z087) | 2.2681 | -0.3167 | 0.2411 |
| u_SDSS | 0.9152 | R062 | (R062 - Z087) | 1.9022 | -0.9002 | 0.2128 |
| u_SDSS | 1.1746 | R062 | (R062 - Z087) | 1.5195 | -0.7464 | 0.2247 |
| u_SDSS | 1.5293 | R062 | (R062 - Z087) | 1.2389 | -0.1240 | 0.1617 |
| u_SDSS | 2.0582 | R062 | (R062 - Z087) | 2.3557 | 0.0955 | 0.2126 |
| u_SDSS | 2.9779 | R062 | (R062 - Z087) | 3.5148 | 1.9374 | 0.1755 |
| u_SDSS | 5.2891 | R062 | (R062 - Z087) | 2.3631 | 4.1819 | 0.1479 |

### Table 72: Target filter: g_SDSS, Reference facility: WFIRST

| F_Tar   | z   | F_Ref   | Col     | alpha   | beta   | sigma |
|---------|-----|---------|---------|---------|--------|-------|
| g_SDSS | 0.0369 | R062 | (R062 - Z087) | 1.2502 | 0.0355 | 0.0519 |
| g_SDSS | 0.1149 | R062 | (R062 - Z087) | 1.4210 | -0.0143 | 0.0243 |
| g_SDSS | 0.2025 | R062 | (R062 - Z087) | 1.3998 | 0.0989 | 0.0432 |
| g_SDSS | 0.3021 | R062 | (R062 - Z087) | 1.2328 | 0.2683 | 0.0495 |
| g_SDSS | 0.4170 | R062 | (R062 - Z087) | 1.0633 | 0.4483 | 0.0486 |
| g_SDSS | 0.5519 | R062 | (R062 - Z087) | 1.1874 | 0.2919 | 0.0622 |
| g_SDSS | 0.7142 | R062 | (R062 - Z087) | 1.2316 | 0.0055 | 0.0903 |
| g_SDSS | 0.9152 | R062 | (R062 - Z087) | 1.1754 | -0.5101 | 0.1015 |
| g_SDSS | 1.1746 | R062 | (R062 - Z087) | 0.8297 | -0.4067 | 0.0924 |
| g_SDSS | 1.5293 | R062 | (R062 - Z087) | 0.5760 | -0.0558 | 0.0452 |
| g_SDSS | 2.0582 | R062 | (R062 - Z087) | 0.8279 | 0.0023 | 0.0498 |
| g_SDSS | 2.9779 | R062 | (R062 - Z087) | 1.5381 | 0.0432 | 0.0540 |
### Table 73: Target filter: r_SDSS, Reference facility: WFIRST

| F_Tar  | z      | F_Ref | Col            | alpha     | beta     | sigma  |
|--------|--------|-------|----------------|-----------|----------|--------|
| r_SDSS | 0.0369 | R062  | (R062 - Z087)  | 0.0161    | -0.0068  | 0.0020 |
| r_SDSS | 0.1149 | R062  | (R062 - Z087)  | 0.0205    | -0.0059  | 0.0029 |
| r_SDSS | 0.2025 | R062  | (R062 - Z087)  | 0.0167    | 0.0154   | 0.0053 |
| r_SDSS | 0.3021 | R062  | (R062 - Z087)  | 0.0515    | -0.0190  | 0.0105 |
| r_SDSS | 0.4170 | R062  | (R062 - Z087)  | 0.1456    | -0.1271  | 0.0101 |
| r_SDSS | 0.5519 | R062  | (R062 - Z087)  | 0.2265    | -0.1376  | 0.0267 |
| r_SDSS | 0.7142 | R062  | (R062 - Z087)  | 0.0995    | 0.0879   | 0.0121 |
| r_SDSS | 0.9152 | R062  | (R062 - Z087)  | 0.0496    | 0.0786   | 0.0145 |
| r_SDSS | 1.1746 | R062  | (R062 - Z087)  | 0.1200    | -0.0669  | 0.0148 |
| r_SDSS | 1.5293 | R062  | (R062 - Z087)  | 0.0814    | -0.0114  | 0.0077 |
| r_SDSS | 2.0582 | R062  | (R062 - Z087)  | 0.0013    | -0.0049  | 0.0071 |
| r_SDSS | 2.9779 | R062  | (R062 - Z087)  | 0.0316    | -0.0162  | 0.0057 |
| r_SDSS | 5.2891 | R062  | (R062 - Z087)  | 0.3013    | -0.2119  | 0.0073 |

### Table 74: Target filter: i_SDSS, Reference facility: WFIRST

| F_Tar  | z      | F_Ref | Col            | alpha     | beta     | sigma  |
|--------|--------|-------|----------------|-----------|----------|--------|
| i_SDSS | 0.0369 | Z087  | (R062 - Z087)  | 0.4716    | -0.0469  | 0.0169 |
| i_SDSS | 0.1149 | Z087  | (R062 - Z087)  | 0.3997    | -0.0058  | 0.0123 |
| i_SDSS | 0.2025 | Z087  | (R062 - Z087)  | 0.3550    | 0.0070   | 0.0033 |
| i_SDSS | 0.3021 | Z087  | (R062 - Z087)  | 0.3555    | -0.0053  | 0.0032 |
| i_SDSS | 0.4170 | Z087  | (R062 - Z087)  | 0.3844    | -0.0138  | 0.0047 |
| i_SDSS | 0.5519 | Z087  | (R062 - Z087)  | 0.4094    | -0.0495  | 0.0144 |
| i_SDSS | 0.7142 | Z087  | (R062 - Z087)  | 0.4928    | -0.2076  | 0.0170 |
| i_SDSS | 0.9152 | Z087  | (R062 - Z087)  | 0.4843    | -0.1340  | 0.0291 |
| i_SDSS | 1.1746 | Z087  | (R062 - Z087)  | 0.3988    | 0.2500   | 0.0235 |
| i_SDSS | 1.5293 | R062  | (R062 - Z087)  | -0.4902   | 0.0451   | 0.0129 |
| i_SDSS | 2.0582 | R062  | (R062 - Z087)  | -0.4279   | -0.0036  | 0.0057 |
| i_SDSS | 2.9779 | Z087  | (R062 - Z087)  | 0.3713    | -0.0038  | 0.0047 |
| i_SDSS | 5.2891 | R062  | (R062 - Z087)  | -0.4091   | -0.3308  | 0.0064 |

### Table 75: Target filter: z_SDSS, Reference facility: WFIRST

| F_Tar  | z      | F_Ref | Col            | alpha     | beta     | sigma  |
|--------|--------|-------|----------------|-----------|----------|--------|
| z_SDSS | 0.0369 | Z087  | (R062 - Z087)  | -0.1109   | 0.0172   | 0.0043 |
| z_SDSS | 0.1149 | Z087  | (R062 - Z087)  | -0.0986   | 0.0076   | 0.0060 |
| z_SDSS | 0.2025 | Z087  | (R062 - Z087)  | -0.0749   | -0.0111  | 0.0017 |
| z_SDSS | 0.3021 | Z087  | (R062 - Z087)  | -0.0830   | 0.0093   | 0.0014 |
| z_SDSS | 0.4170 | Z087  | (R062 - Z087)  | -0.0764   | 0.0003   | 0.0018 |
| z_SDSS | 0.5519 | Z087  | (R062 - Z087)  | -0.0942   | 0.0092   | 0.0020 |
| z_SDSS | 0.7142 | Z087  | (R062 - Z087)  | -0.0932   | 0.0347   | 0.0064 |
| z_SDSS | 0.9152 | Z087  | (R062 - Z087)  | -0.1210   | 0.0694   | 0.0091 |
| F_Tar  | z    | F_Ref | Col            | alpha  | beta  | sigma  |
|--------|------|-------|----------------|--------|-------|--------|
| z_SDSS| 1.1746 | Z087  | (R062 - Z087)  | -0.0555| -0.0887| 0.0056 |
| z_SDSS| 1.5293 | Z087  | (R062 - Z087)  | -0.0986| -0.0194| 0.0066 |
| z_SDSS| 2.0582 | Z087  | (R062 - Z087)  | -0.1206| 0.0003 | 0.0031 |
| z_SDSS| 2.9779 | Z087  | (R062 - Z087)  | -0.0911| -0.0009| 0.0015 |
| z_SDSS| 5.2891 | Z087  | (R062 - Z087)  | -0.1384| 0.0757 | 0.0047 |

Table 76: Target filter: Z_VISTA, Reference facility: WFIRST

| F_Tar  | z    | F_Ref | Col            | alpha  | beta  | sigma  |
|--------|------|-------|----------------|--------|-------|--------|
| Z_VISTA| 0.0369 | Z087  | (Z087 - Y106)  | 0.1217 | -0.0170| 0.0019 |
| Z_VISTA| 0.1149 | Z087  | (Z087 - Y106)  | 0.1690 | -0.0196| 0.0015 |
| Z_VISTA| 0.2025 | Z087  | (Z087 - Y106)  | 0.1233 | 0.0033 | 0.0076 |
| Z_VISTA| 0.3021 | Y106  | (Z087 - Y106)  | 0.1337 | -0.0096| 0.0049 |
| Z_VISTA| 0.4170 | Y106  | (Z087 - Y106)  | 0.1606 | -0.0177| 0.0046 |
| Z_VISTA| 0.5519 | Y106  | (Z087 - Y106)  | 0.1124 | 0.0184 | 0.0017 |
| Z_VISTA| 0.7142 | Y106  | (Z087 - Y106)  | 0.1095 | -0.0113| 0.0020 |
| Z_VISTA| 0.9152 | Y106  | (Z087 - Y106)  | 0.1511 | -0.0012| 0.0032 |
| Z_VISTA| 1.1746 | Y106  | (Z087 - Y106)  | 0.0735 | 0.0116 | 0.0096 |
| Z_VISTA| 1.5293 | Y106  | (Z087 - Y106)  | 0.2079 | -0.1268| 0.0198 |
| Z_VISTA| 2.0582 | Y106  | (Z087 - Y106)  | 0.1620 | 0.0865 | 0.0100 |
| Z_VISTA| 2.9779 | Y106  | (Y106 - J129)  | 0.0975 | -0.0010| 0.0034 |
| Z_VISTA| 5.2891 | Y106  | (Y106 - J129)  | 0.2005 | 0.0026 | 0.0014 |

Table 77: Target filter: Y_VISTA, Reference facility: WFIRST

| F_Tar  | z    | F_Ref | Col            | alpha  | beta  | sigma  |
|--------|------|-------|----------------|--------|-------|--------|
| J_VISTA| 0.0369 | J129  | (Y106 - J129)  | 0.0680 | 0.0079 | 0.0035 |
| J_VISTA| 0.1149 | J129  | (Y106 - J129)  | 0.0974 | 0.0005 | 0.0009 |
| J_VISTA| 0.2025 | J129  | (Y106 - J129)  | 0.0714 | -0.0079| 0.0018 |
| J_VISTA| 0.3021 | J129  | (Y106 - J129)  | 0.1336 | -0.0204| 0.0024 |
Conclusions

This work offers a hopefully useful set of filter conversion references, and will be regularly modified going forwards as new facilities and filter sets are defined. The main limitations are:
• The physicality of the ProSpect SED processing approach (see Robotham, et al. 2020 for details on the implementation),
• The physicality of the galaxies generated by Shark, where we are limited by the realism of the star formation and metallicity histories generated (see Lagos, et al. 2018 for details on the implementation),
• The accuracy of the filters used, where in reality many filters degrade and change throughput characteristics over time, and the effective throughput is modified by variable water vapour in the atmosphere at the time of any given observation etc.

Users are able to create arbitrary conversions with a larger set of filters through our web tool available at http://transformcalc.icrar.org. Furthermore, users can specify their own filters directly, but in this case it is necessary to use ProSpect directly as per https://rpubs.com/asgr/567881.

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References

Davies, et al. 2018. MNRAS 480: 768.
González-Fernández, et al. 2018. MNRAS 474: 5459.
Lagos, et al. 2018. MNRAS 481: 3573.
Robotham. 2016. ASCL 1604.004.
Robotham, et al. 2020. MNRAS 495: 905.