A high positive correlation between the distance and temperature of the hottest nearby space objects
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Abstract

The paper uses the distance and temperature of 47,111 hottest nearby space objects including stars, quasars, white dwarf, and carbon stars. We have used SIMBAD Astronomical Database and obtained this information from 930,000 records. The range of temperature of the hottest objects is between 6158 and 99,575 K. Also, the distance of the objects is between 231.7375 and 1 (mas). We report the correlation between the distance and temperature of these hot objects at the temperature upper than 6632 K is equal to 0.135063 and will be increased to 0.32001 at temperatures upper than 9860 K. Also, the correlation between the temperature and distance of objects hotter than 12,000 K is equal to 0.270218.

Keywords: distance, temperature, correlation, star, space

Introduction

Recently, we have reported a positive correlation (0.914384) between the possibility of finding unexpected high Redshift (Z greater than 0.001) and the average temperature of nearby objects in different categories [1]. By analyzing information of 199 high Redshift nearby objects we realized that most of them are quasar and white dwarf, and an average temperature of them is almost 9,771 K. The SIMBAD Astronomical Database told us "some of them showed up as stars in SDSS imaging data because they look like point sources, but they were followed up for spectra so that we can tell that they are actually quasars. The stars have Redshifts near zero and the quasars have Redshift values in the expected range". Hence, we decided to find the correlation between distance and temperature of hottest objects.

We obtained more than 930,000 records of hottest objects from the SIMBAD Astronomical Database and wrote a program for deleting repeated data. Finally, information of 47,111 hottest objects retrieved, including stars, quasars, white dwarf, and carbon stars. The distances of the objects are between 231.7375 and 1 (mas), and objects with redshift less than zero have been excluded.

Normally we do not expect to find a significant relationship between the distance of our nearby space objects and their temperature. The first results did not show a significant positive correlation of all objects with different temperatures, but after choosing objects with high temperatures, we found a significant positive correlation between temperature and distance of the hottest nearby space objects.

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This paper is a statistical report, and we do not try to explain the reasons for this high correlation.

**Histogram**

In the SIMBAD Astronomical Database, the total number of the nearby space objects (distance less than 1 mas) with a temperature higher than 6158 K is equal to 47,111. The SIMBAD Astronomical Database uses the Parallax method to obtain the distance of the space objects. Hence, we could expect precise distance of objects.

Table.1 shows the top hottest space objects and their distance. Most of them are quasars, white dwarf, and carbon stars.

| Star Name                  | Temperature | Parallax (mas) |
|----------------------------|-------------|----------------|
| SDSS J092651.43+254859.0   | 99575       | 1.5027         |
| SDSS J145545.58+041508.6   | 99575       | 1.658          |
| 2QZ J133710.1-002644       | 95733.5     | 3.1521         |
| SDSS J132858.19+590851.0   | 94514.5     | 6.6602         |
| SDSS J200646.50-124410.9   | 93374.5     | 1.1089         |
| NGC 4688                   | 89520       | 1.7841         |
| SDSS J211607.27+004503.2   | 88852.5     | 3.9088         |
| SDSS J222203.33-003138.1   | 88434       | 1.4757         |
| SDSS J100612.78+252833.6   | 87287.5     | 2.4609         |
| SDSS J161613.09+252012.6   | 86556       | 1.5088         |
| KUV 03459+0037             | 86359       | 2.5214         |
| SH 2-216                   | 84990       | 7.9404         |
| SDSS J160236.07+381950.5   | 82904.5     | 1.1114         |
| PN A66 7                   | 82710       | 2.0204         |
| SDSS J082153.01+190659.1   | 82213.6666666667 | 1.1727 |
| HZ 34                      | 82188.3333333333 | 1.6505 |
| Ton 309                    | 82168.8333333333 | 2.9982 |
| PB 7489                    | 78839.1428571429 | 1.907 |
| GD 524                     | 78750       | 21.1885        |
| SDSS J101700.39+190110.1   | 78197.5     | 1.1778         |
| SDSS J105555.23+484739.8   | 77370       | 1.2227         |
| PG 1543+454                | 77293.3333333333 | 2.0611 |
| HD 223816                  | 76690       | 6.5857         |
| WD 2121-076                | 76624.2     | 2.3702         |
| SDSS J074632.00+415210.2   | 76569.4     | 1.3487         |
| CD-45 5058                 | 75858       | 1.7077         |
| SDSS J101619.80-020258.2   | 75536       | 2.8029         |
| LB 651                     | 75062.5     | 1.7978         |
Analyzing data of the hottest nearby objects shows that most of them are quasar, carbon star, or white dwarf. Hence, we will find the correlation between distance and temperature of them. Most of them have high redshift, and according to the SIMBAD Astronomical Database some of them showed up as stars in SDSS imaging data because they look like point sources.

First, we present a histogram of the data. Regardless of the temperature of the space objects Fig.1 illustrates the histogram of them. The X-axis is the distance of the objects in the light year, and Y-axis is the number of space objects. Earth is in an arm of the Milky Way. Hence, by increasing the distance, the number of space objects will be decreased, because of going to the free space out of the arm.

**Fig.1:** Histogram of 47,111 hottest nearby space objects.

![Histogram of 47,111 hottest nearby space objects.](image1)

**Fig.2:** Histogram of 23,555 nearby space objects with temperature between 6155 and 6632 K.

![Histogram of 23,555 nearby space objects with temperature between 6155 and 6632 K.](image2)

**Fig.3:** Histogram of 23,556 nearby space objects with temperature higher than 6632 K.

![Histogram of 23,556 nearby space objects with temperature higher than 6632 K.](image3)
Fig.2 and Fig.3 illustrate the histogram of the nearby objects in two different categories of temperatures. Fig.2 is a histogram of 23,555 objects with a temperature lower than 6632 K, and Fig.3 illustrates a histogram of the 23,556 objects hotter than 6632 K. The distribution of both categories is almost the same. Hence, we could not expect to find the different values of the correlation between distance and temperature of them.

**Results**

Firstly, we choose the biggest category, including all 47,111 space objects. The correlation between distance and temperature is equal to 0.076109063, which is almost zero. Secondly, we obtain the correlation between distance and temperature of the 23,555 objects with a temperature lower than 6632 K. The correlation between distance and temperature is equal to -0.03736, which is less than zero. After choosing a new category of the objects, including the 23,556 objects hotter than 6632 K, the correlation between distance and temperature will be obtained equal to 0.135063, which is higher than the colder category.

We have obtained the correlation between distance and temperature for new categories, including hotter space objects. Table.2 illustrates the relationship between the distance and temperature of the nearby objects. The correlation between distance and temperature of the space objects hotter than 9860 K is equal to 0.32001.

| Temperature (K)       | Number of objects | Correlation between distance and temperature |
|-----------------------|-------------------|-----------------------------------------------|
| Greater than 6158     | 47,111            | 0.076109063                                   |
| Between 6158 and 6632 | 23,555            | -0.03736                                      |
| Greater than 6632     | 23,556            | 0.135063                                      |
| Greater than 9860     | 8,924             | 0.32001                                       |
| Greater than 12000    | 7,027             | 0.270218                                      |
| Greater than 15000    | 4,882             | 0.194355                                      |

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