**The many faces of Nicolas’s PhD thesis**

(Funders: Alexis Rouillard & Pierre-Louis Blelly) nicolas.poirier@irap.omp.eu, Toulouse, France

---

**Modeling the Early Evolution of a Slow Coronal Mass Ejection Imaged by the Parker Solar Probe**

- [Rouillard et al. 2020, ApJS](https://doi.org/10.3847/1538-4365/ab6610)

  - Modeling the CME kinematics solving a 1-D force balance [Chen 1996]
  - Reconstructing the 3-D internal magnetic field using the Grad-Shafranov equation [Priest E., 1996]
  - Reproducing the observed propagation of a slow CME by a two-phase injection of poloidal flux
  - **Future work:** reconstruct CME signatures measured in situ at PSP & SoLO

---

**Simulating the FIP Effect in Coronal Loops Using a 1-D Multi-Species Kinetic-Fluid Model**

- [Poirier et al. 2021, in prep]

  - ISAM solves the 16 transport eq of the VDF \( n_uT_i^3_
  - Momentum and energy exchanges by collisions
  - Testing different heating models (ad-hoc functions: [Pinto et al. 2017], [Reville et al. 2020a] ; A\text{lfv\text{\textsc{\textregistered}}}n waves dissipation: [L√\text{ie-Svendsen et al. 2001}] [Chandran et al. 2011])
  - Including both ponderomotive and thermal forces to study the FIP effect
  - Photoionization, radiative & di-electronic recombination, direct ionization by collisions with e\textsuperscript{\textbullet}, auto-ionization
  - **Future work:** compare our model with composition measurements made by spectrometry and in situ at Hinode, SoLO & PSP

---

**Exploiting white-light observations to improve estimates of magnetic connectivity**

- [Poirier et al. 2021, under review]

  - Comparing white-light observations of the streamer belt against coronal models in a systematic manner
  - Ranking automatically models according to their performances
  - Suitable for any magnetogram and model type (e.g. PFSS, MHD)
  - **Future work:** Combine LASCO-C2 with STA-COR2 + METIS

---

**Detailed Imaging of Coronal Rays with the Parker Solar Probe**

- [Poirier et al. 2020, ApJ](https://doi.org/10.3847/1538-4365/ab6324)

  - Understanding the fine structure of streamer rays
  - Making synthetic WISPR images
  - Exploiting 3-D coronal models to help the interpretation of WISPR observations
  - **Future work:** Making METIS and SoLO-HI synthetic white-light images

---

**Center image:** Combined image of the solar disk as observed in many wavelengths by SDO/AIA & SDO/HMI. Credits: NASA's Goddard Space Flight Center Scientific Visualization Studio, the SDO Science Team, and the Virtual Solar Observatory.