



Announcement of Master Thesis Project

Solar-stellar connection: detection of coronal mass ejections on late-type stars

Background:

- Coronal mass ejections (CMEs) are huge clouds of magnetized plasma expelled with speeds of hundreds to thousands km/s. They are the major source of disturbances of our space weather. On the Sun, CMEs are regularly imaged and measured with coronagraph instruments.
- For other stars, the situation of observing CMEs is much more difficult, and currently no proper detection methods exist. However, despite the limited observational evidence so far, the CME-productivity of a star is a crucial factor in determining the habitability of the exoplanets the star is hosting as well as for the stellar mass and angular momentum loss.
- For the Sun, it was recently established that so-called “coronal dimmings” provide a valuable means to observe CMEs and to characterize their main parameters, by measuring the depletion in the coronal emission due to the expulsion of the CME plasma ([Dissauer et al. 2018a](#), [2018b](#)).

Aims of thesis:

- Study spatially resolved and unresolved (“Sun-as-a-star”) measurements of coronal intensity depletions associated with solar CMEs to establish relations that can be used for the detection of stellar CMEs. Data: EUV images and spectral light curves from the AIA and EVE instruments onboard NASA’s SDO satellite.
- Evaluate the relations of spatially unresolved intensity depletions on the Sun with the associated flare and CME properties. Apply typical “stellar” observing conditions to simulate the observations of coronal dimmings on late-type and solar-like stars, and assess their potential as an indicator of stellar CMEs.

Requirements:

- Master student in Physics with focus astrophysics or space physics, or Space Sciences.
- Good background in astrophysics and solar physics.
- Good programming skills, preferably in IDL and/or Matlab.

The thesis is embedded in a research project funded by the Austrian Space Applications Program, within a solar-stellar team. It is supported by a scholarship of 500 EUR/month for 6+3 months. The thesis will be supervised by Assoc.-Prof. Dr. Astrid Veronig and Dr. Karin Dissauer.

Planned start: February/March 2019

Please send your application until 2018 December 10 to astrid.veronig@uni-graz.at and karin.dissauer@uni-graz.at, including a motivation letter, CV and transcript of studies.