The longitudinal, line-of-sight magnetic flux as a proxy for stellar activity

Federica Rescigno
University of Exeter

In order to break the stellar activity barrier, the community has been investigating new proxies. I present the longitudinal, line-of-sight magnetic flux (B_{los}) as a novel and effective proxy. B_{los} can be measured more easily than its unpolarised counterpart, and the BCool Collaboration has shown that high-precision measurements can be obtained even for slowly-rotating, relatively inactive stars, such as the Sun. I compute B_{los} using data from the Helioseismic Magnetic Imager mounted on the Solar Dynamics Observatory (SDO/HMI). I then carry out a Gaussian Process (GP) regression analysis on HARPS-N solar RV data. I show that training the GP on B_{los} yields more information on the stellar activity hyperparameters and provides better constrained priors than the S-index. In particular, B_{los} performs excellently at determining the stellar rotation period.

I also investigate the minimum precision required for B_{los} measurements to meaningfully inform EPRV surveys, and find that comparable precisions have been reported on existing spectropolarimeters.