Breaking the ultimate barrier to characterising other Earths

Stellar activity or Earth-mass planet?

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The barrier: stars do not have static, uniform surfaces

The only way to break the activity barrier is by treating stellar magnetic variability as what it really is: a physically-driven, fully deterministic process, rather than simply “noise”!
Solar and stellar investigations with HARPS-North

We are now observing the Sun as a star continuously with HARPS-N (Dumusque et al., 2015; Phillips et al., 2016).

In parallel, I will undertake a large-scale study of the activity patterns of other Sun-like stars on the stellar rotation timescale.

I will identify a direct proxy for faculae, which is the key to overcoming the stellar activity barrier in precise mass determinations.
I will incorporate the lessons learnt from my solar and stellar investigations into a robust and flexible framework based on Gaussian processes and Bayesian statistics (see Haywood et al., 2014; López-Morales, Haywood et al., 2016).

Determining precise and reliable planet masses is a necessary step to characterising the atmospheres and interiors of potentially habitable, Earth-like planets to be discovered in the coming years with the TESS, CHEOPS and JWST missions.