

Line-Profile Variations in Radial Velocity Measurements Using a Skew Normal Distribution

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Line-Profile Variations in Radial Velocity Measurements Using a Skew Normal Distribution

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In collaboration with Prof. Jessi Cisewski and Xavier Dumusque

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September 8th 2017

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The Radial Velocity Technique



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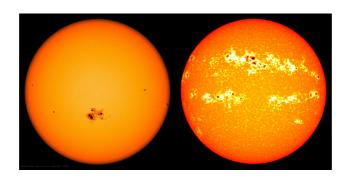
Measuremen-Skew Normal



source: http://www.eso.org/public/australia/videos/eso1035g/

Active Regions





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source: www.nasa.gov

- Spot: cooler and fainter
- Faculae: hotter and brighter
- The presence of active regions leads to 2 effects:
 - Flux
 - 2 Convection

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Is it an active region or a planet?



- The variations in Radial Velocity caused by active regions are similar to the ones we expect for "Earth-like" planets (few m/s).
- Disentangling the Stellar Activity from the "pure" signal coming from the Exoplanets is tricky
- One way is to summarize all the absorption lines of a stellar spectrum into a singular curve, called line profile (or CCF)

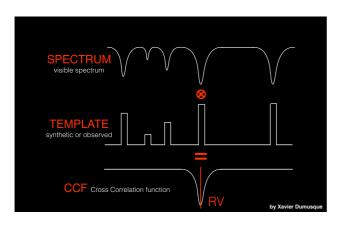
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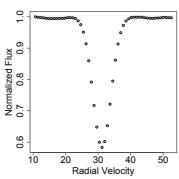
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The Line Profile







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- The **CCF** represents an **average absorption line** for the entire stellar spectrum.
- From the CCF, 2 information are retained: the Radial Velocity of the star and a summary about its stellar activity (i.e. the asymmetry of the CCF).

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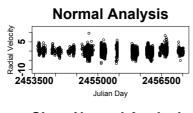
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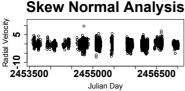
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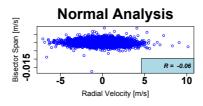
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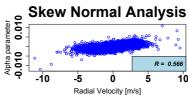
Analyses on a real Star: Tau Ceti











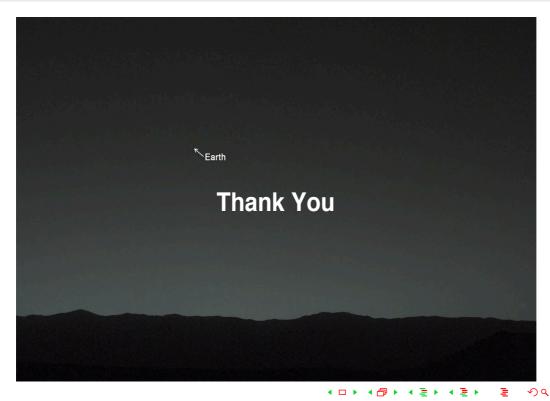
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- In terms of Radial Velocity the results between the 2 methods are similar
- Using the Skew Normal distribution provides a more clear evaluation of the asymmetry of the line profile, allowing a better interpretation of the stellar activity of the star





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