Splinter on winds/environment

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Impact of winds on exoplanets

- Star/planet formation
  - Strong star-planet interaction
  - Not targets for SPICA
- Main sequence
  - M dwarfs: strong magnetic interaction, needs complementary observations like SPIROU, magnetic field measurements
  - Otherwise no significant impact of winds on the MS
- Later evolution
  - There is impact from winds (red giants, evolved stars, massive evolved stars), but these are not (prime) exoplanet targets

Impact of winds on asteroseismology targets

- Wind/mass loss has an impact on red giants
  - Red giants might not be main targets for PLATO, only as complementary science
  - For red giants, CHARA-SPICA can get estimates of flux fractions of the CSE and geometric sizes of envelopes
- Sub-giants: mass loss more negligible than for red giants
- More massive stars, B, Be, B[e] stars
  - not core targets, but winds would have an impact.
  - With SPICA, need to model an additional geometrical component
  - SPICA can be complementary to asteroseismology missions for hotter stars

Impact of winds on SBCRs

- SBCRs explore
  - Dwarfs, subgiant, giants
  - Different metallicities
  - B, mostly FK, stars some M dwarfs
  - Target list will already be ‘cleaned’
- For hotter stars we have to take environments into account (for creating and using them)
- M dwarfs have winds, which need to be taken into account (for creating and using them)
- Impact on infrared photometry, reddening (for creation)
- For K giants there is impact from mass loss, which creates reddening

Selection of 200 bright stars

- AGB/RSG stars
  - mV<5 excludes many red dust-enshrouded stars
  - Explore possibility to include AGB/Miras/RSG/post-RSG (around maximum light)
  - Define upper limit on the angular diameter, so that they are not over-resolved
  - get complementary short-baseline data (e.g. SPHERE, or speckle imaging)
  - Observe few stars in details (incl. shocks in Halpha) with time-series (AI: need to find targets)
  - There are ongoing projects to observe large samples of AGB stars, need to explore the sample
- Winds in K giants / first giant branch stars:
  - Better targets for CHARA/SPICA in terms of angular size
  - Do statistics for a large number of stars on CSE flux fraction, dust shell sizes
- O stars: no targets
- B, Be, B[e] stars:
  - Certainly interesting targets for CHARA/SPICA
  - Velocity measurements with MR spectral resolution
  - Not much expertise in our splinter meeting
- Variable stars (Cepheids, del Sct, RR Lyrae)
  - find/characterize envelopes
  - Are CSEs common for these targets?

Complementary ways/observations

- Combine uv-plane filling with 8m-class AO instruments (e.g. SPHERE)
- Spectro-polarimetric measurements
  - pMS, M dwarfs: Magnetic fields
  - Evolved stars: Linear polarization
- Models
  - Cool stars: need to include more physical processes (magnetic fields, radiative pressure on lines in addition to convection), constrain new models
  - Hot star wind models
- Evolved stars: Combine SED, spectroscopy, interferometric imaging at several wavelength, CO observations, etc.
- VLTI-MATISSE observations of dust: difficult to find common targets?
- B, Be, B[e]:
  - Radio observations (free-free emission)
  - Near/mid-IR imaging observations

Strategies

- Time series for variable stars
- Some stars observable only at maximum light?
- Spectral resolution
  - AGB/RSG stars would need higher spectral resolution to measure velocity fields, but those stars are mostly too resolved for CHARA-SPICA
  - B/Be/B[e] stars: Resolution of 3000 is sufficient to study velocity fields
- To do: get (K magnitude and) angular diameters of all stars brighter than mV=4…5 and observable by CHARA; define upper limit on the angular diameter to not over-resolve the stars