HITS
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How good does a best-fit model need to be to retrieve reliable core and surface rotation rates through rotational inversion?

Oscillation modes of red giants are visible in the power spectrum of a lightcurve as distinct peaks and split due to rotation. We consider splittings of so-called dipole modes. As different modes are sensitive to different depths in the star, we can determine its internal rotation. Information on mode sensitivities is obtained from a model.

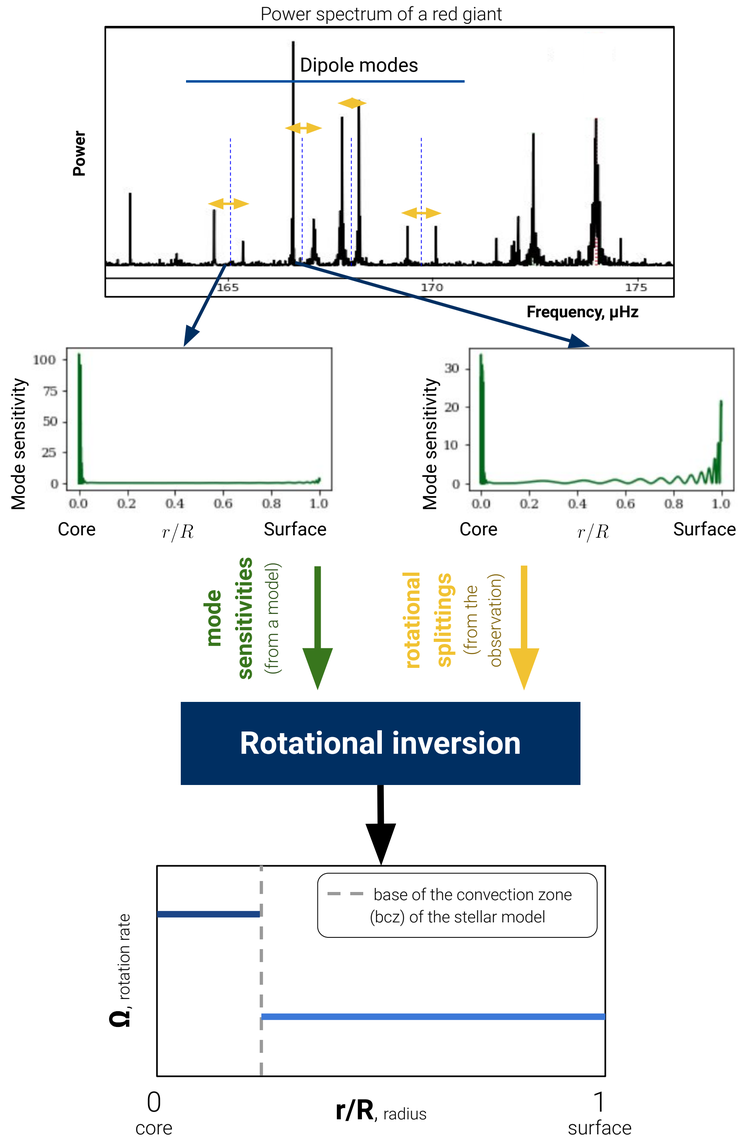

Fig.1. Illustration of rotational inversion method.

We assume that rotation rates are constant below and above the bcz. Motivated by observations (P. G. Beck et al. 2012), we assume that core rotates faster than the envelope.

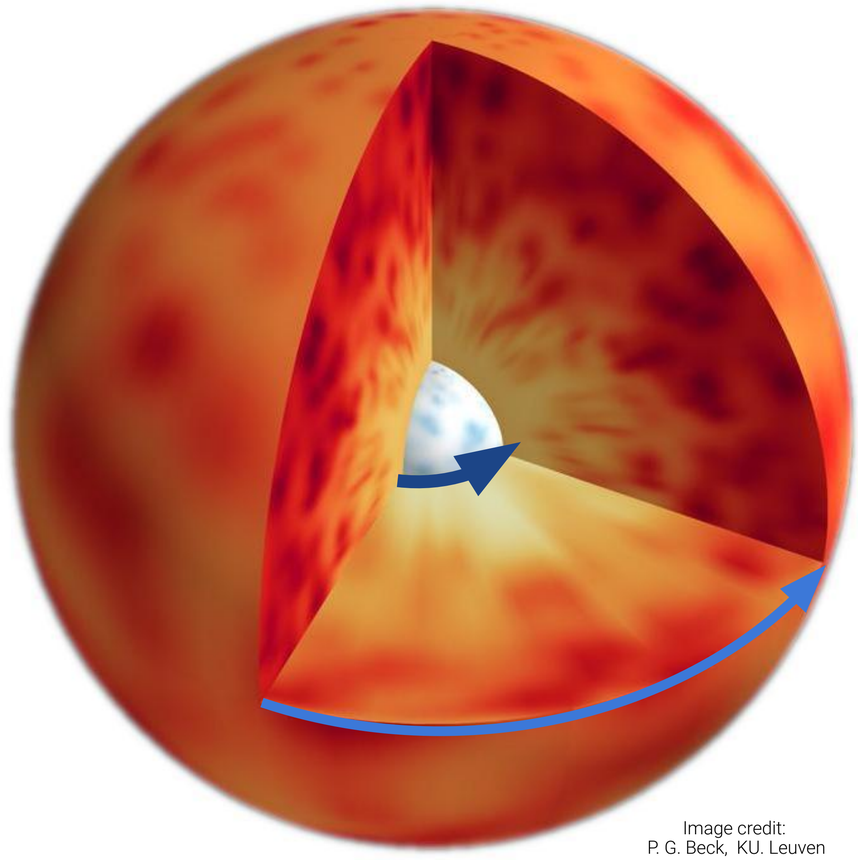

Image credit:
P. G. Beck, KU. Leuven

Stellar models with masses and metallicities that differ from the observed star can be used for the rotation profile reconstruction.

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- We perform rotation profile reconstruction using different stellar models;
- We select one of the models to imitate an observation (synthetic observation);
- The best-fit model selection is based on χ^2 that is computed for mode frequencies of a model and the synthetic observation.

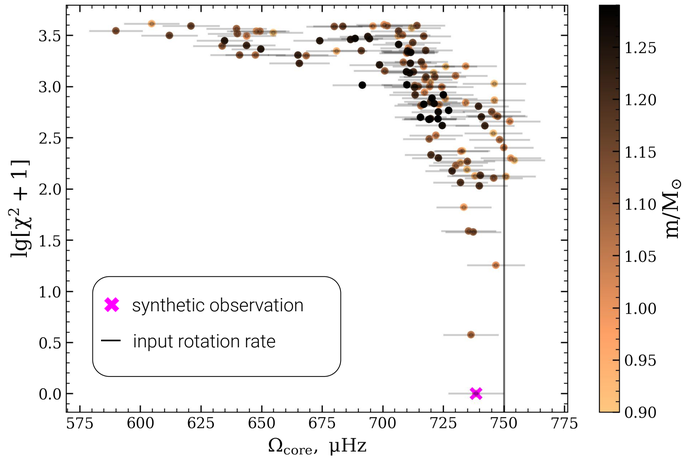

Fig.2. Core rotation rates reconstructed with different models. Gray bars indicate 1σ uncertainties of reconstructed rotation rates.

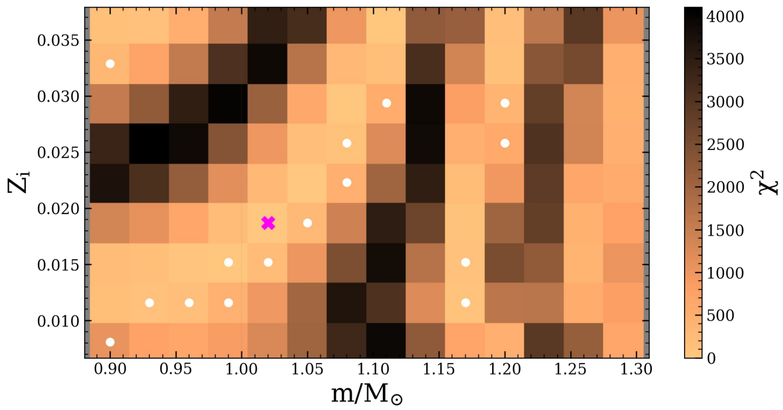

Fig.3. Stellar models with different initial abundances of metals (Z_i) and masses. White circles indicate the models that gave reconstructed rotation rates whose 1σ uncertainties overlap with the input ones.