university of groningen

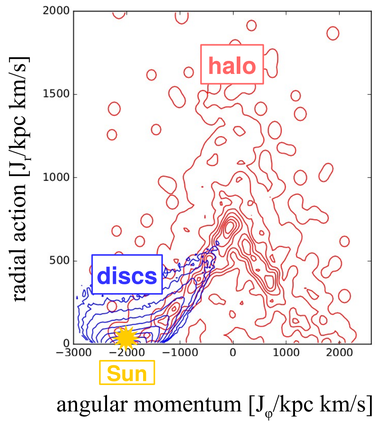
Constraining the dark and stellar halo of our Galaxy with distribution functions

Lorenzo Posti, Amina Helmi & the GALACTICA group

posti@astro.rug.nl

Distribution Functions for the Milky Way

- Analytic functions of three action integrals (J_r, J_φ, J_z) after Binney (2010)
- Axisymmetric models with self-consistent gravitational potential Φ
- Best-fit parametric model:
  - thin/thick discs: fit to RAVE (Piffl et al. '14)
  - stellar halo: fit to SEGUE (Das & Binney '16)
- Method calibration using simulated data: Gaia Universe Model Snapshot (GUMS, Robin et al. '12)



- Probabilistic selection of discs and halo stars
- Separation of discs and halo in action space (integral space)

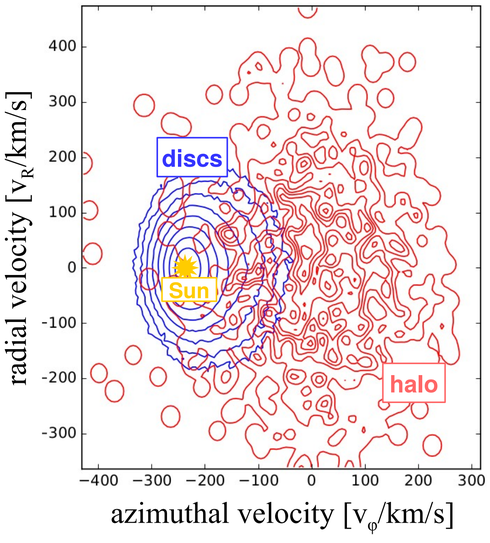
Abstract

i) We use analytic distribution functions to select probabilistically halo stars in a position-velocity space

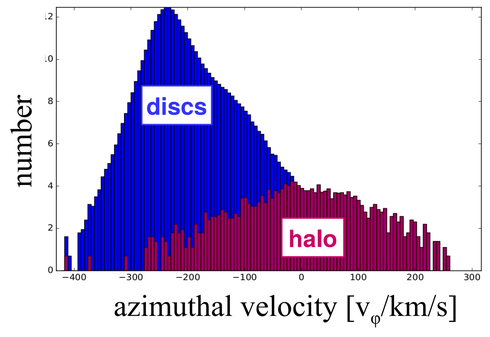
ii) We test & calibrate our method on a mock Gaia catalogs and we recover the input halo's phase-space & metallicity distribution

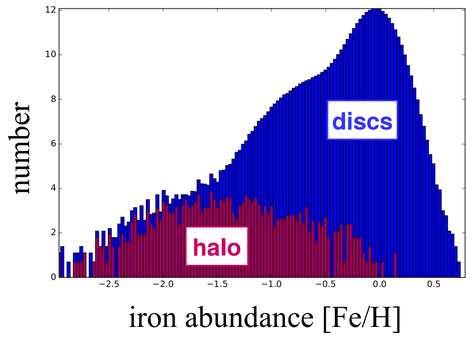
iii) We investigate the feasibility of measuring the misalignment of the halo's velocity ellipsoids with upcoming datasets

A dynamical selection of Milky Way halo stars

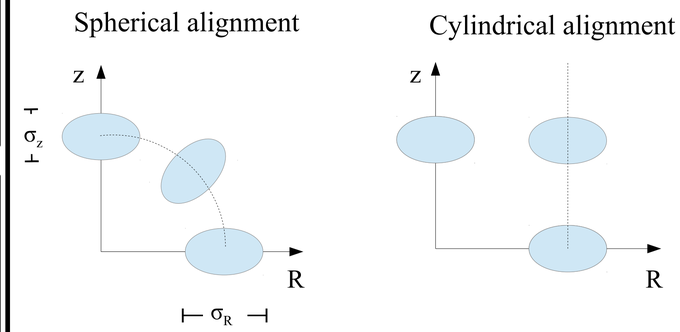


- 6-D phase space information (**X**,**V**) are sufficient to define a (model-dependent) clean halo sample
- Velocity & metallicity distributions in GUMS are well recovered
- Contamination from the thick disc slightly depends on model's parameters
- Dynamically-selected sample is crucial to study the halo's metallicity distribution

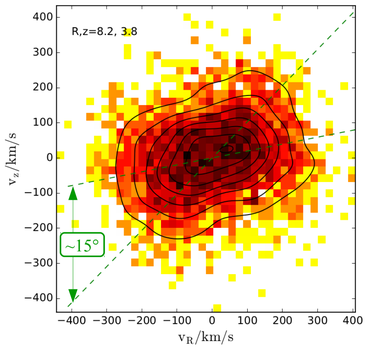




Constraining the stellar halo's velocity ellipsoids



- Halo's velocity ellipsoids are informative on the Galaxy's potential (magnitude, shape etc...)
- E.g., the alignment (above the plane) is related to the symmetry and flattening of Φ
- Can we measure it? Tests with Gaia mocks
- A clean dynamically-selected sample of halo stars to measure alignments to few degrees



References

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