DISC KINEMATICS GROUPS BEYOND THE SUN WITH GAIA

Teresa Antoja

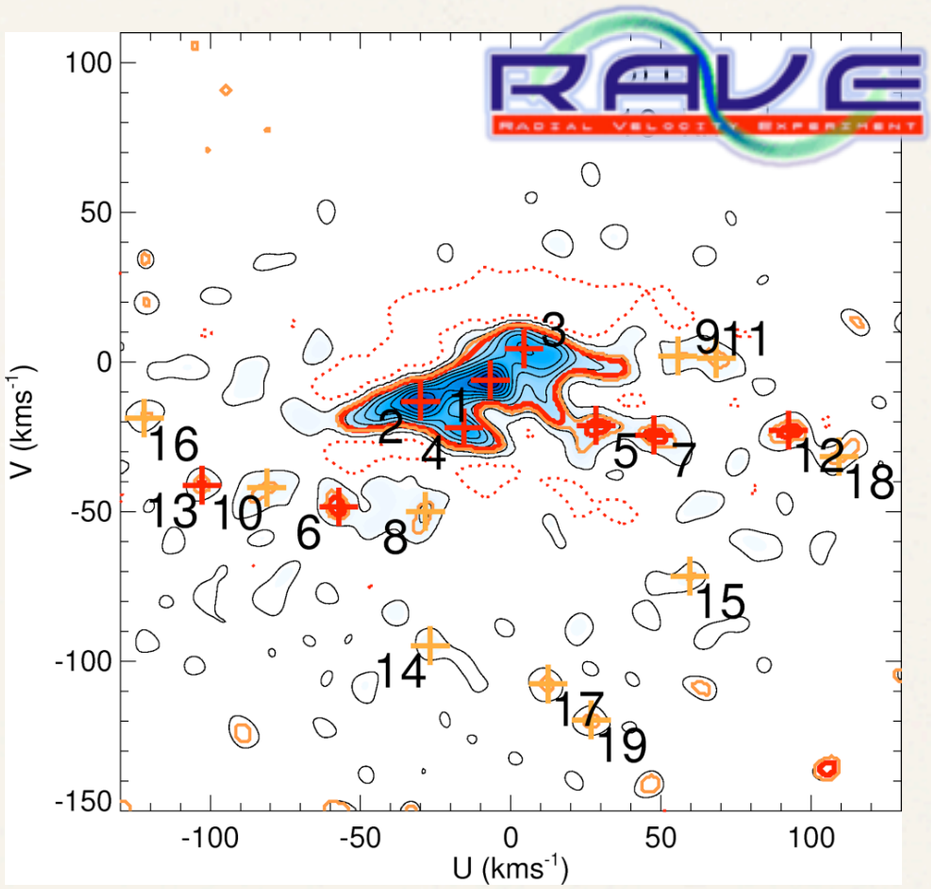
Galaxy Modelling with a Gaia mock catalogue

Barcelona, 1st March 2012

Observed

LOCAL VELOCITY DISTRIBUTION

200 pc around the Sun



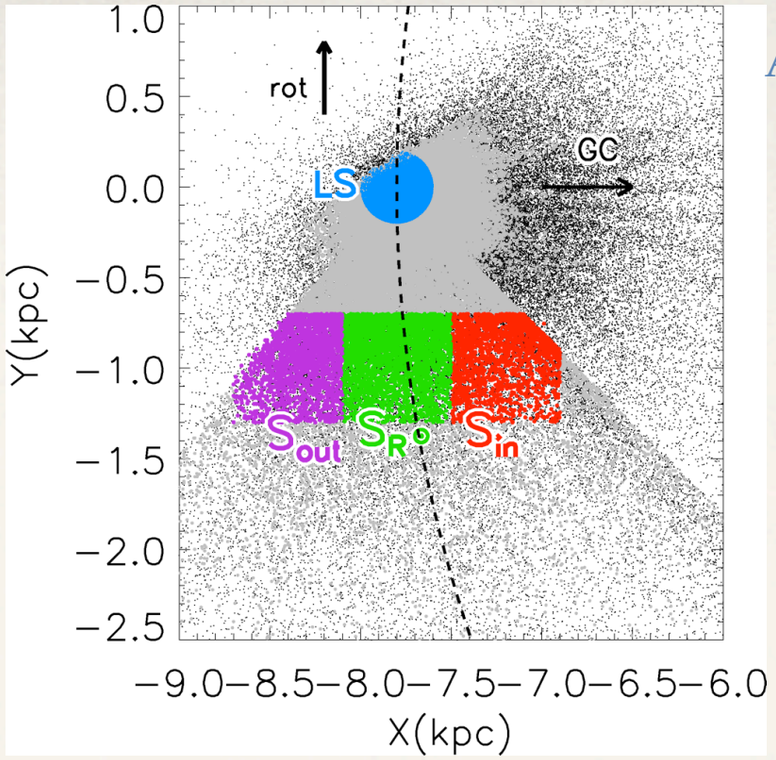
Local kinematic groups can be explained by the effects of the bar and spiral arms

Models predict substructure not only in the solar neighbourhood but also in distant disc regions

Compare these observed structures to our models to see which properties of the spiral arms and the bar reproduce better the observations

Observed

DIFFERENT DISC POSITIONS



Antoja et al. 2012 (in prep.)

Observed

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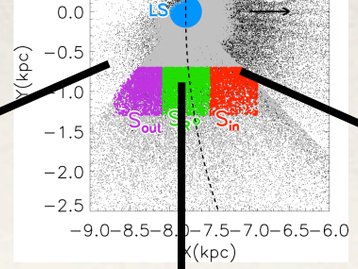

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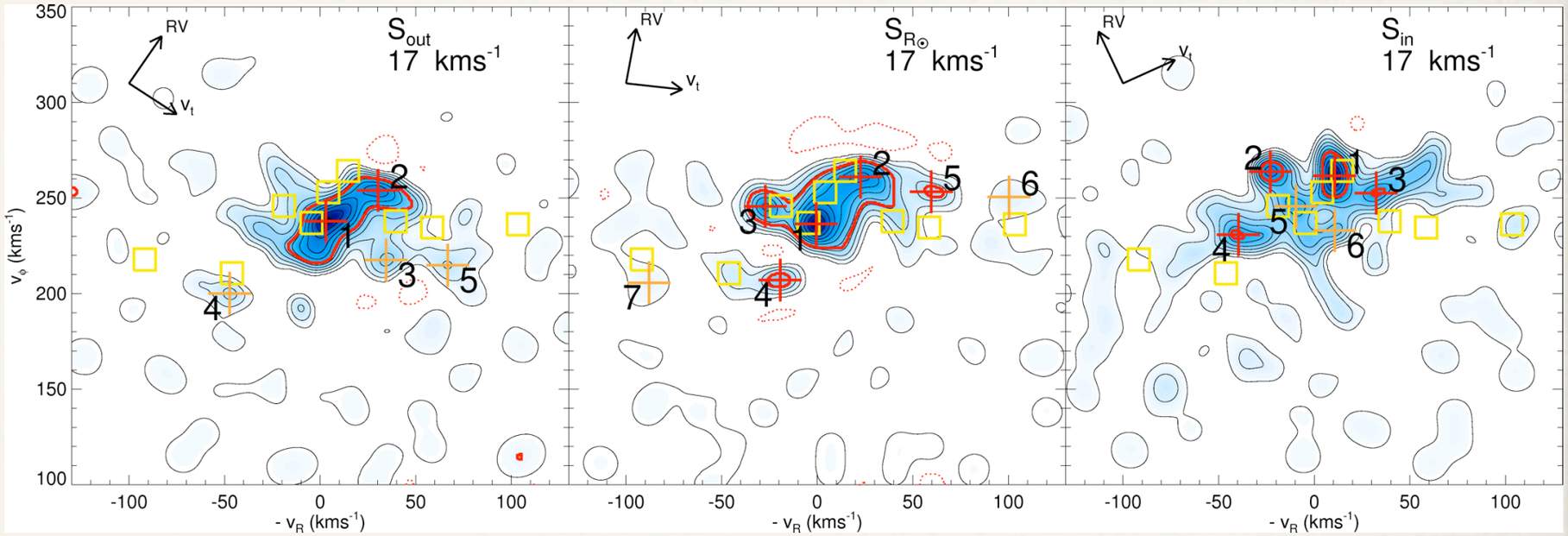
8.1<R<8.7 kpc 7.5<R<8.1 kpc 6.9<R<7.5 kpc



First detection of non-local disc kinematic substructure

Local known groups are still observed at 1 kpc in the solar circle

Known groups are shifted in velocity inside and outside solar circle (bar's OLR ?)

Velocity errors e_{RV}=1-2 km/s e_{VT}= 15 km/s

Observed

Antoja et al. 2012 (in prep.)

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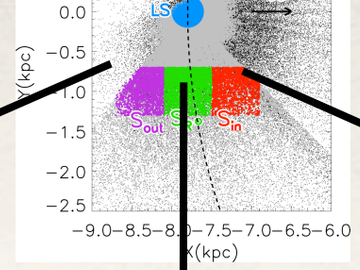

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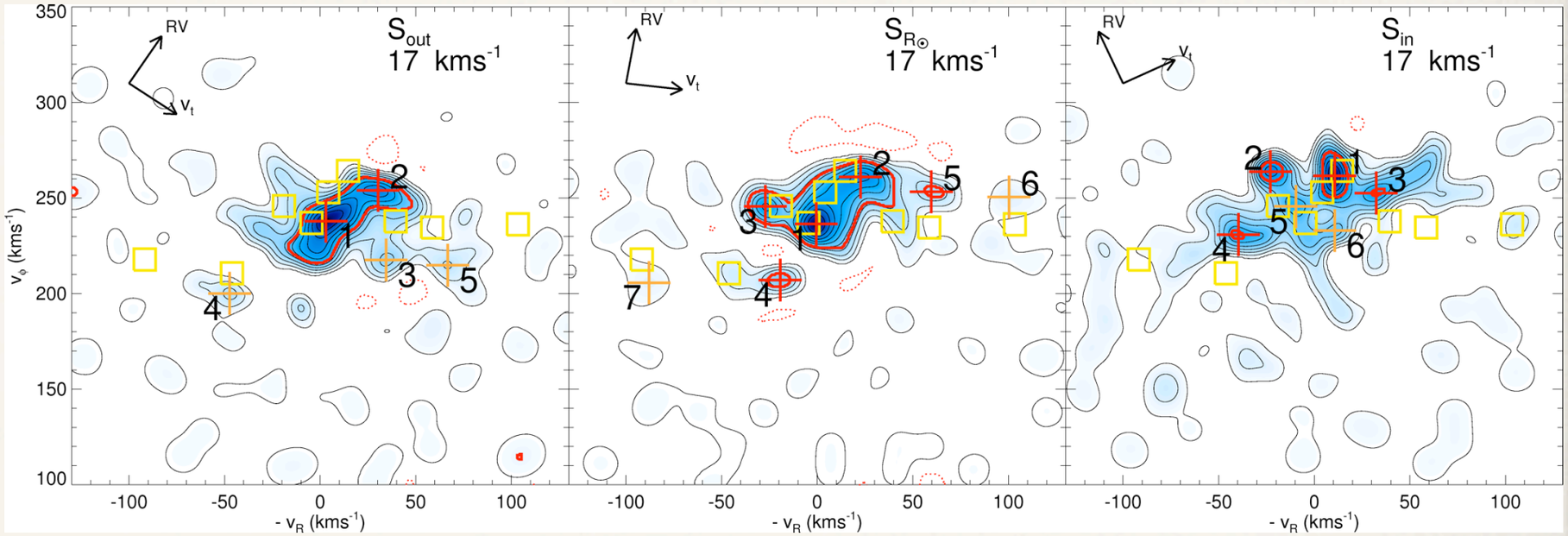

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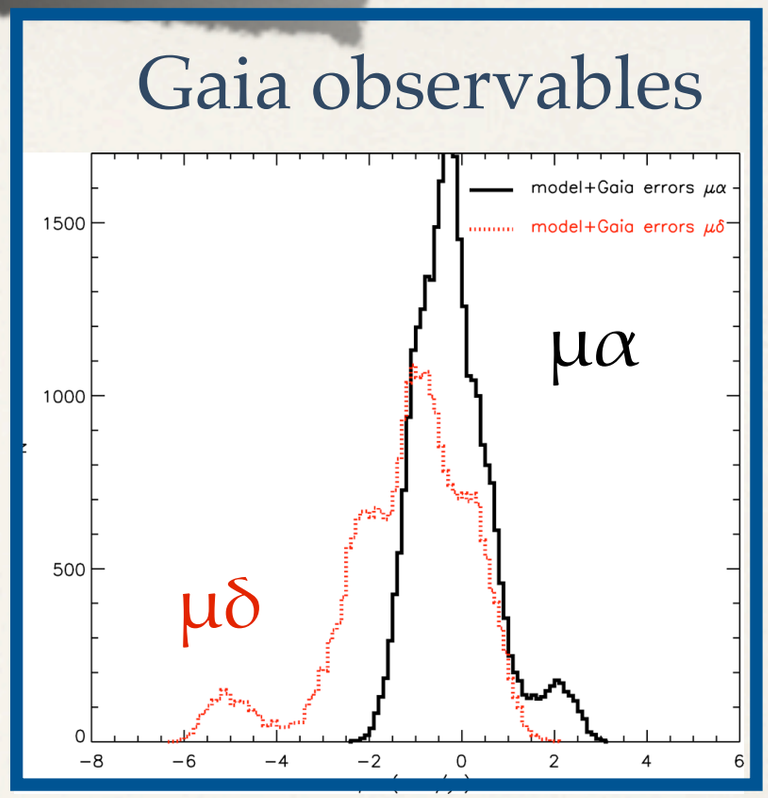
- **Using Gaia mock catalogue (option B): How are the Gaia distant volumes?**
  - **Where? How many stars?**
  - **Distribution of spectral types/ages?**
  - **Characteristic transverse/radial velocity errors?**
  - **Where 6D phase space information? Where only proper motions?**

Simulations into Gaia observables (option A)

1) Perseus arm (anti-centre direction)

(l = 180, b = 0) dist = 2.0 kpc

ST	e_{RV}(km/s)
K5 III	4
B5 V	10
A5 V	20

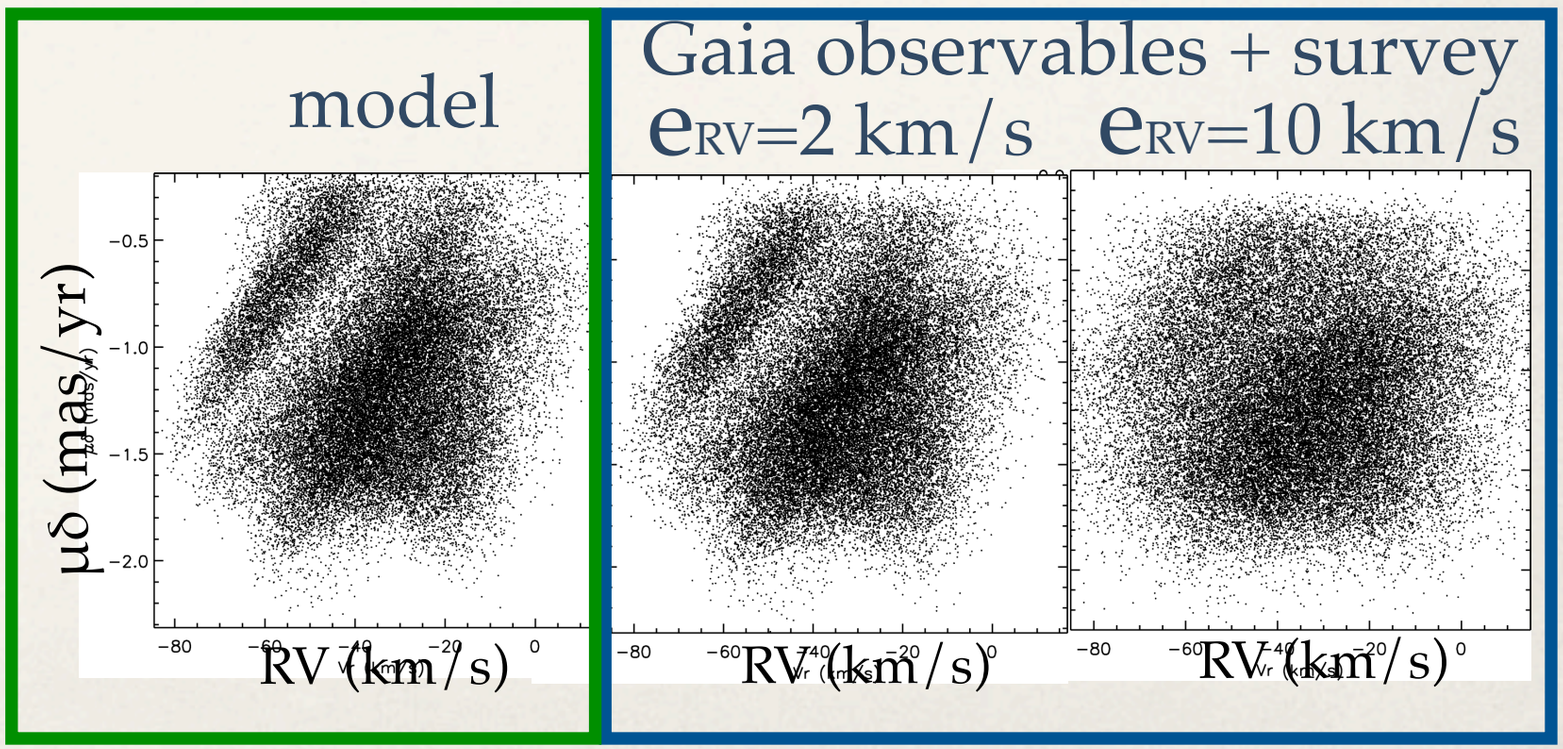


2) Scutum arm tangency

(l = 305, b = 0) dist = 6.9 kpc

K4-5 III → G=18

No radial velocities



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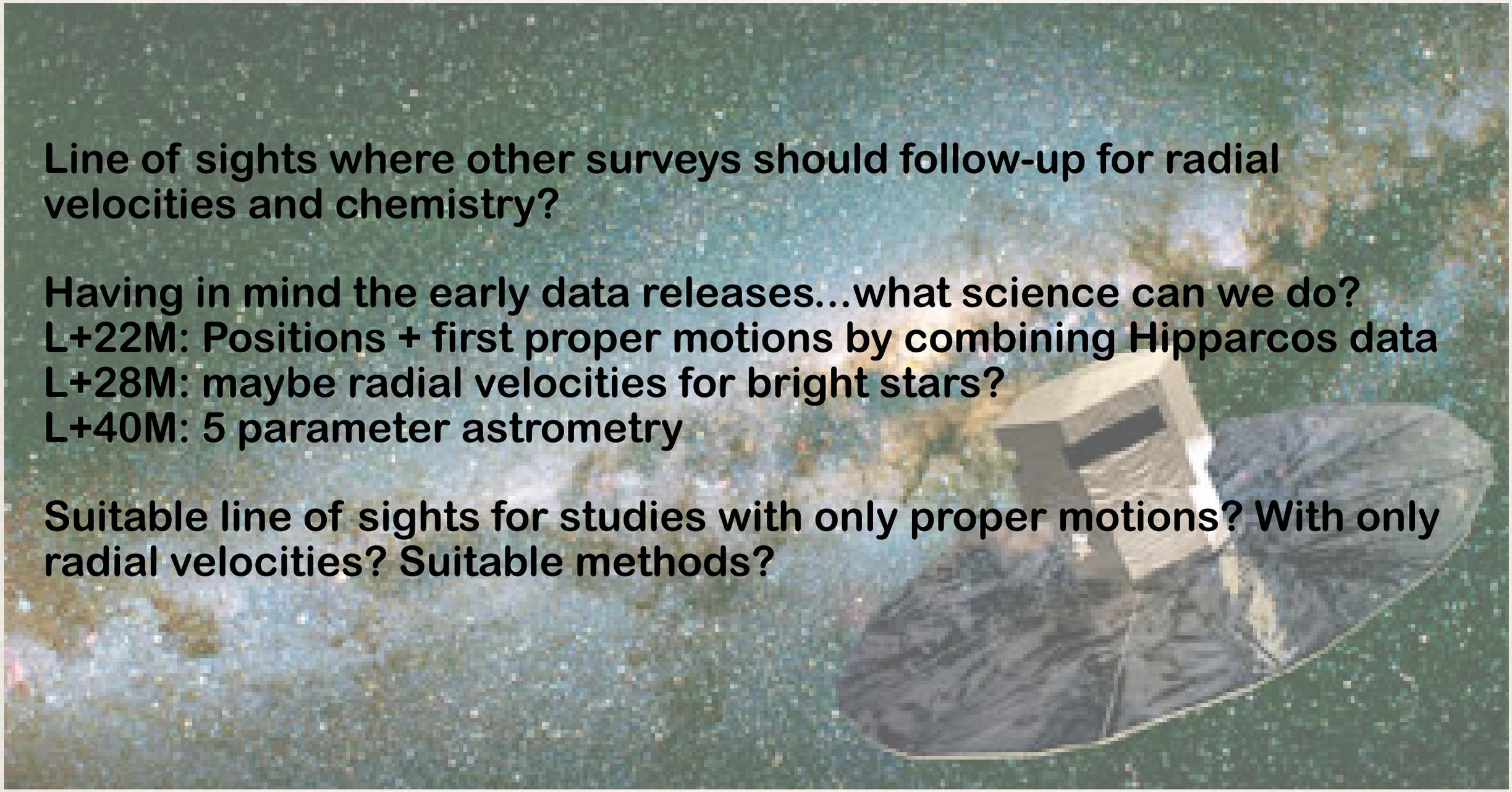
Simulations into Gaia observables (option A)



Line of sights where other surveys should follow-up for radial velocities and chemistry?

Having in mind the early data releases...what science can we do?
L+22M: Positions + first proper motions by combining Hipparcos data
L+28M: maybe radial velocities for bright stars?
L+40M: 5 parameter astrometry

Suitable line of sights for studies with only proper motions? With only radial velocities? Suitable methods?

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Observed

Simulations
BAR + SPIRAL ARMS

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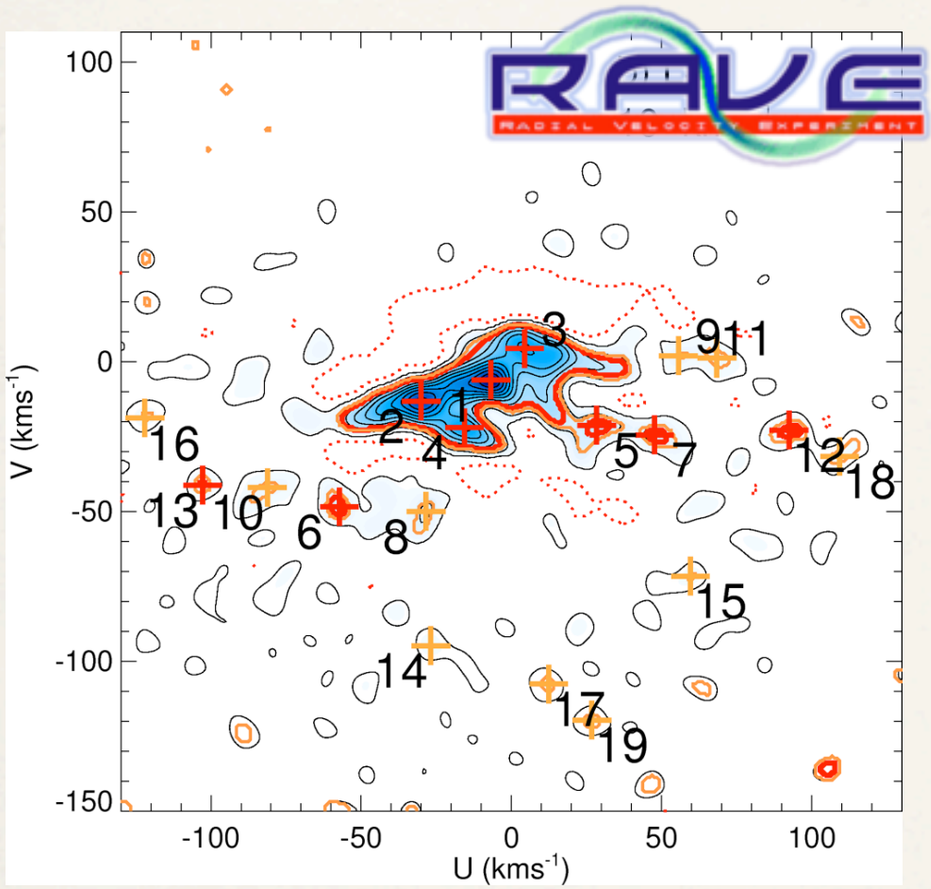

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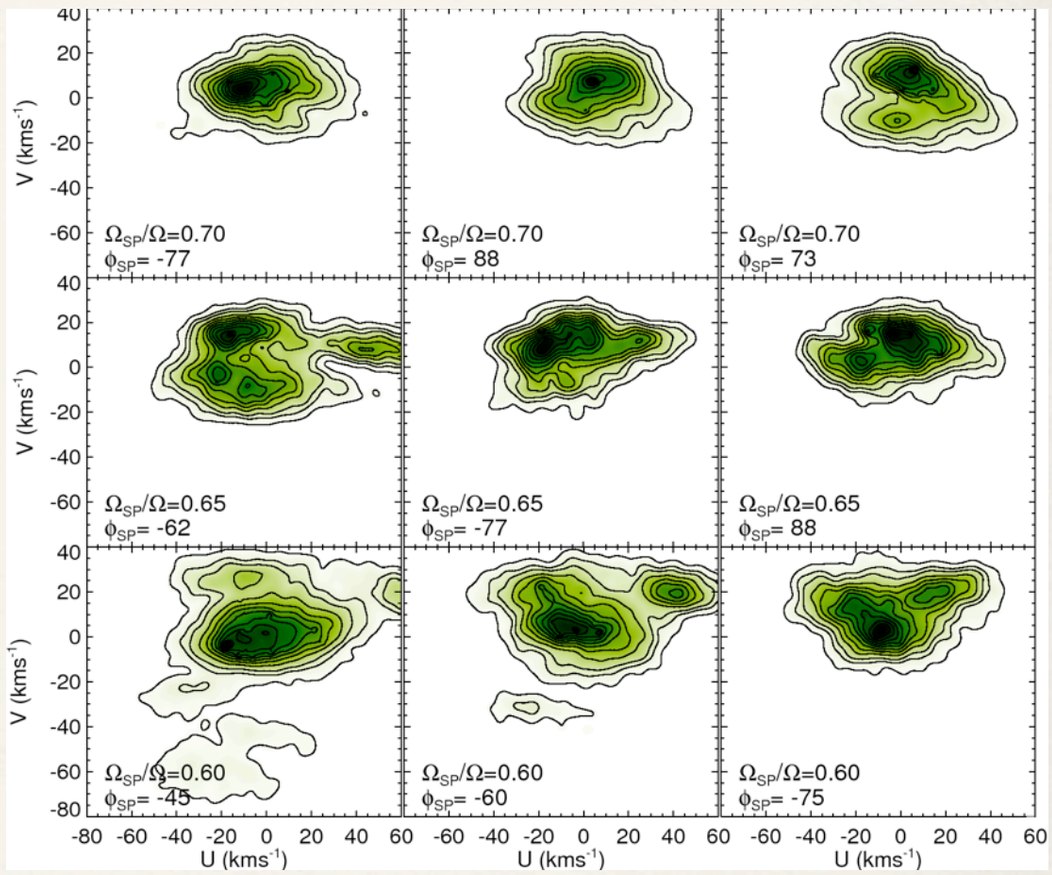

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