The Milky Way and its environment : Clues from streams

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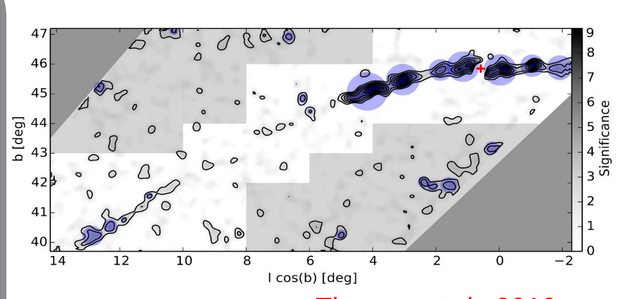
Introduction

- Streams are generated during the disruption of satellite galaxies or globular clusters by a host galaxy.
- Their features are useful to map the galactic potential in 3D → could discriminate between different models.
- Gaps along the streams can help to check for the possible effects of Dark Matter (DM) sub-haloes.

Gaps along the Palomar 5 stream

- Density variations are seen along the Pal 5 stream (*see Grillmair & Dionatos, 2006 or Carlberg et al., 2012*) → could be created by DM subhalos or GMCs that cross the stream.
- The blue circles show the overdensities along the Pal 5 stream



Thomas et al., 2016

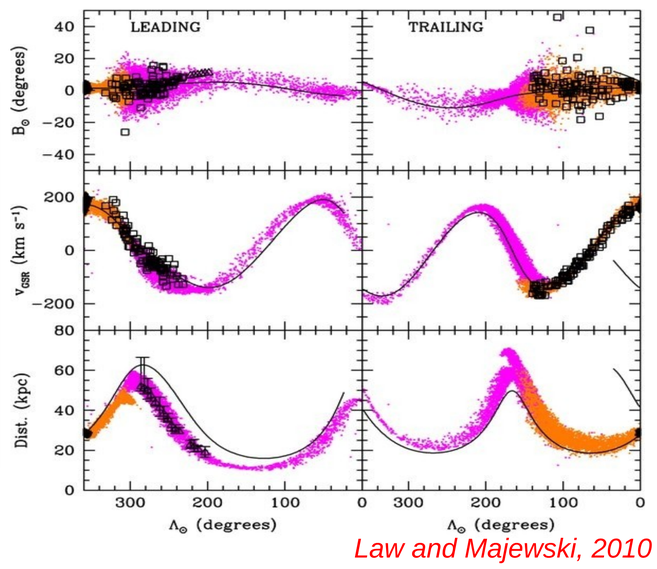
- We build a smooth model and we apply the same method as for the data to extract the overdensities

→ Overdensities are detected even in a smooth stream

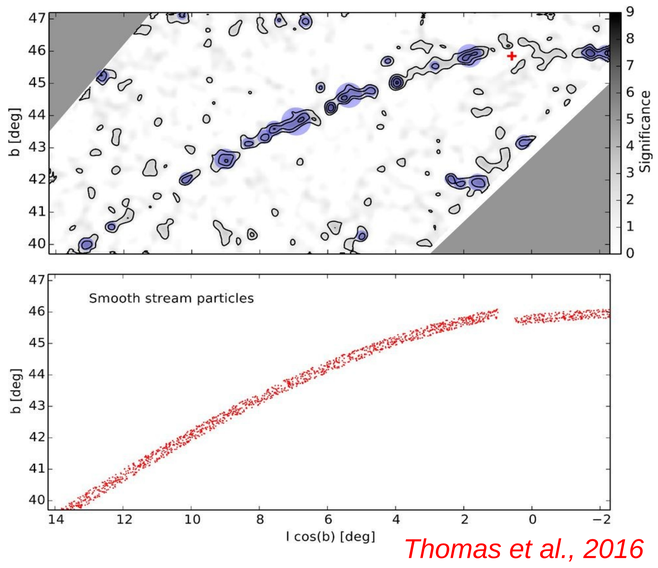
→ **Most of the overdensities can be artificial** (due to the inhomogeneity of SDSS and to the method used to extract the overdensities)

The Sagittarius Stream

- *Law & Majewski, 2010 (LM10)* → need a triaxial DM halo around the Milky Way to reproduce the observed Sgr stream.
- *Debattista et al. (2013)* showed that this DM halo could not host a stable disk.

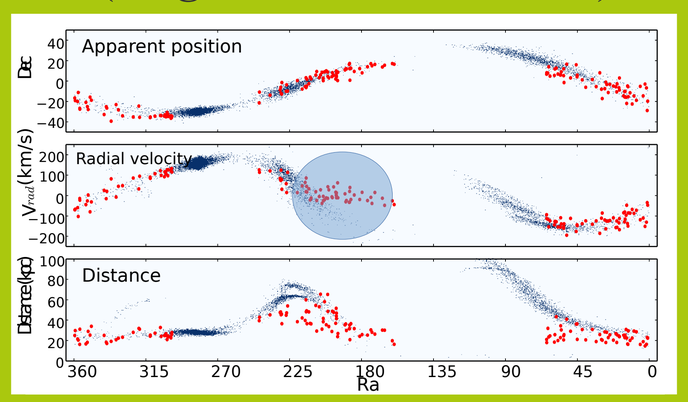


Law and Majewski, 2010



Thomas et al., 2016

- MOND simulations with Phantom-Of-Ramses code (*Lüghausen et al., 2014*).

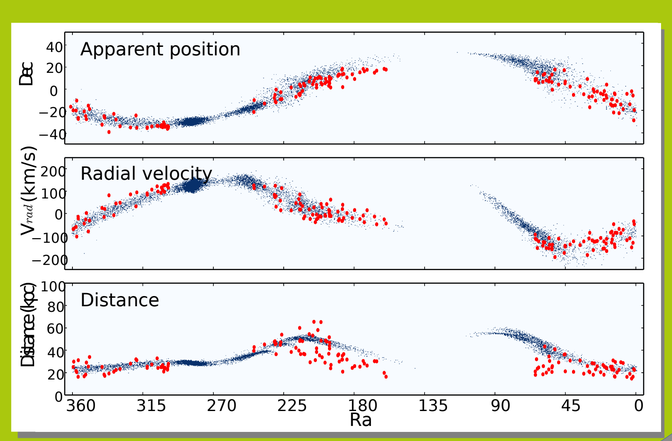


- In blue : Projection of N-body particles after 4 Gyr.
- Red dots : M-giant stars of the Sgr stream from *Majewski et al. (2004)*.

→ **Radial velocity too high between RA=160-220°**

- We added a hot gaseous (2 – 2,8.10^{11} $M_\odot$) halo with a triaxiality similar to the DM halo of LM10.

→ **This time all the observed parameters are well reproduced.**



Conclusions

- The Sagittarius stream can be reproduced in MOND dynamics with an additional triaxial component.
- We will study the survival of progenitors of streams in MOND dynamics to reproduce other streams such as Pal 5 or GD-1.
- Variations in density seen along the stream of Palomar 5 are largely due to the effect of the small number statistics in the SDSS and not necessarily an effect of a flyby encounter with DM subhalos.
- It will be interesting to ascertain whether a similar effect could explain the gaps seen along other stellar streams, such as GD-1.

For more details please come and chat to me !