

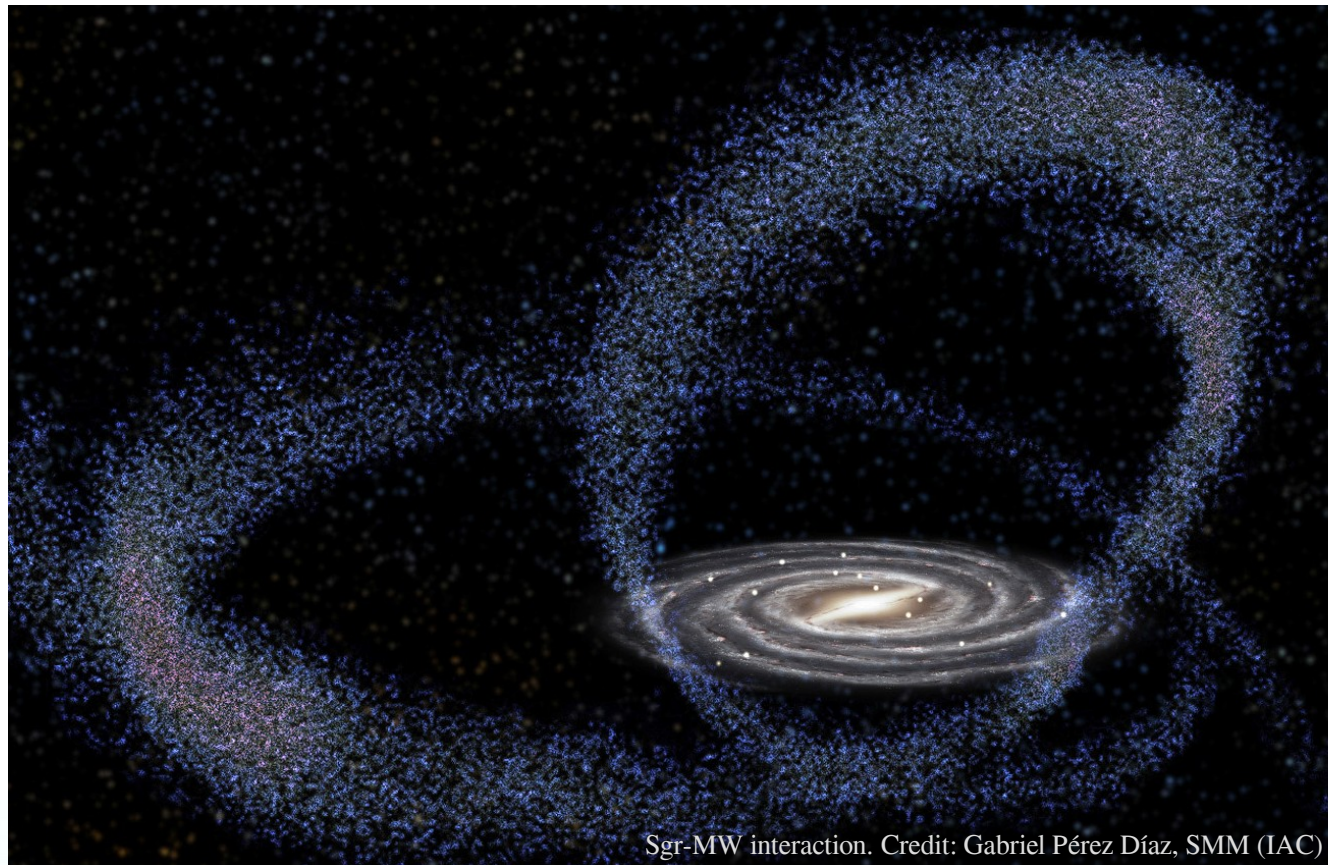


The recurrent impact of the Sagittarius dwarf on the Milky Way star formation history

T. Ruiz-Lara; C. Gallart; E.J. Bernard; S. Cassisi

The measurement of distances to individual stars with Gaia is enabling the construction of deep colour-magnitude diagrams (CMD) for large volumes within our Galaxy in absolute magnitudes. Comparison with models (CMD-fitting) has allowed us to obtain the most detailed star formation history (SFH) of the bubble of 2 kpc around the Sun. Surprisingly, this SFH presents conspicuous star forming events around 5.7, 2 and 1 Gyr ago, coinciding with inferred pericentric passages of the Sagittarius dwarf galaxy (Sgr). We conclude that Sgr has been an important actor in the build-up of the stellar mass of the Milky Way disc.

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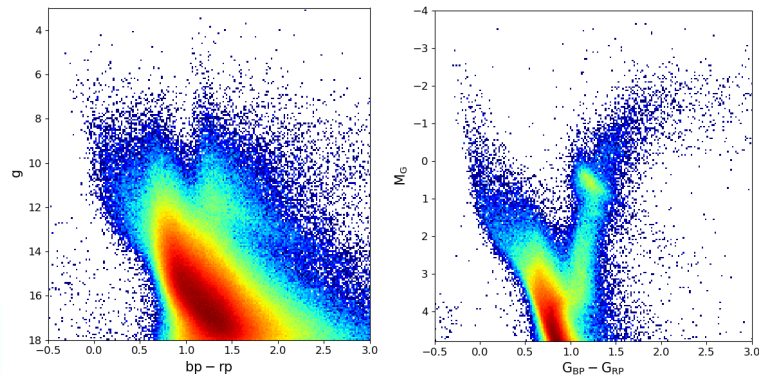


Sgr-MW interaction. Credit: Gabriel Pérez Díaz, SMM (IAC)

SFH of the Milky Way

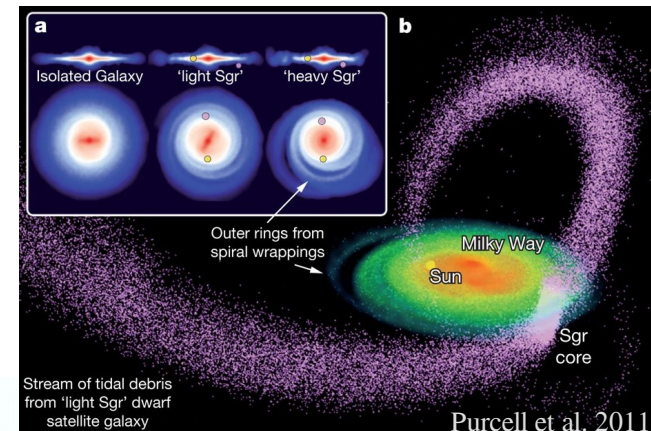
- Previous determinations of the MW SFH were mainly concentrated in the Solar neighbourhood (within 250 pc) or lacked age resolution Bertelli+2001, Cignoni+2006, Mor+2019
- Gaia distances and current 3D dust maps enable reconstruction of CMDs in the absolute plane for large MW volumes. This allows to use **CMD-fitting** techniques → **SFH and age distributions**

Lallement+2018, Casagrande+2018, Babusiaux+2018



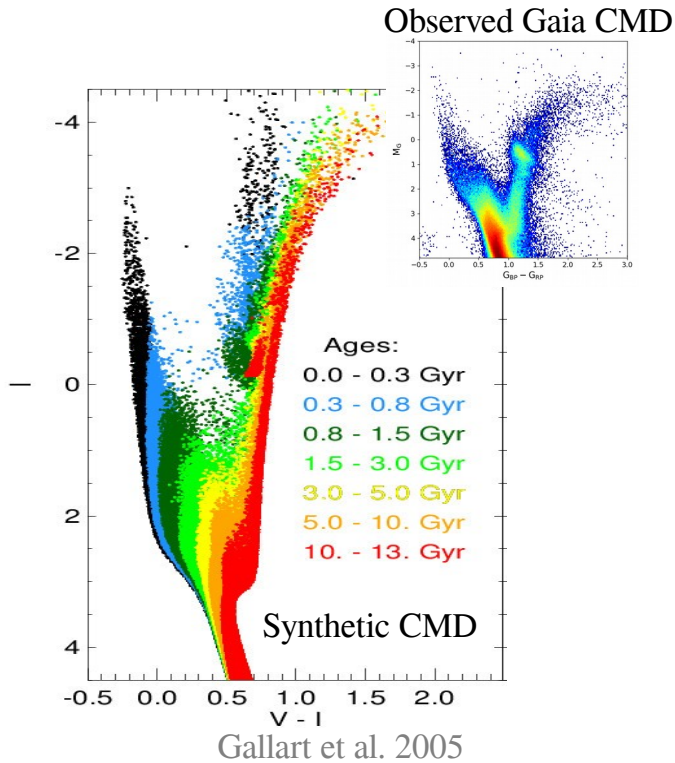
Interactions

- Satellites orbiting disc galaxies can induce phase space features and trigger star formation
Quinn+1993, Siebert+2011, Mihos&Hernquist 1994
- Sgr has experienced several pericentric passages, being the main architect of the dynamics of our Galaxy during the last 6 Gyr
Purcell+2011, Laporte+2018



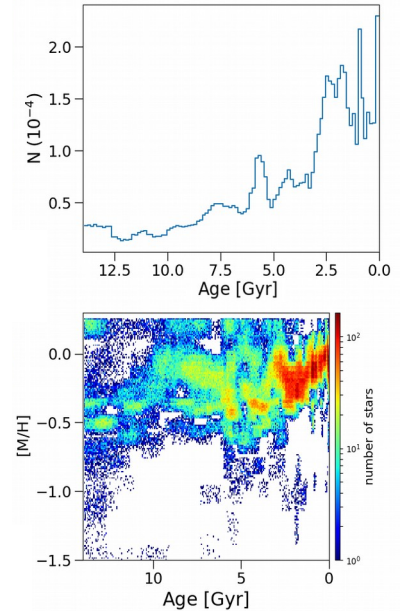
Purcell et al. 2011

METHOD: CMD FITTING TECHNIQUES



The distribution of stars across the observed CMD is compared with that in a synthetic CMD

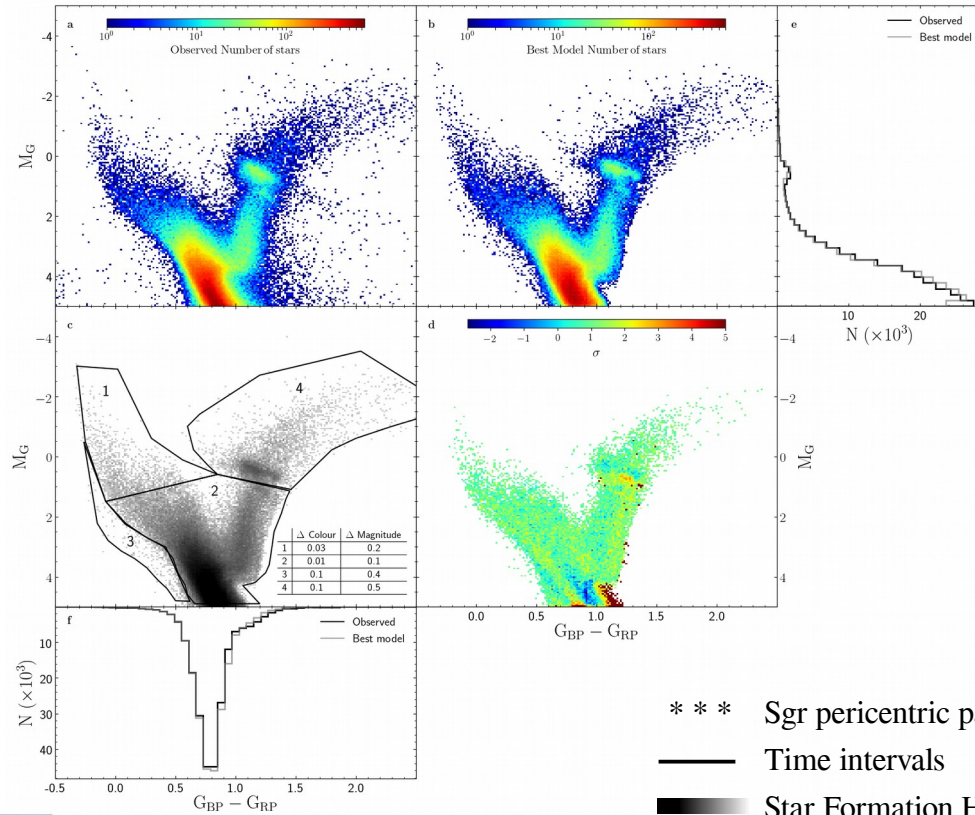
Star formation history (SFH) and thus age and $[M/H]$ distributions are derived



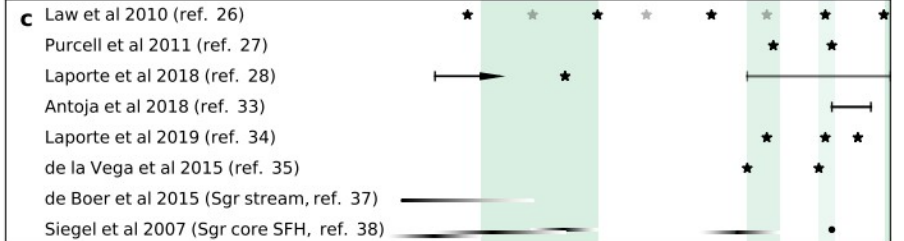
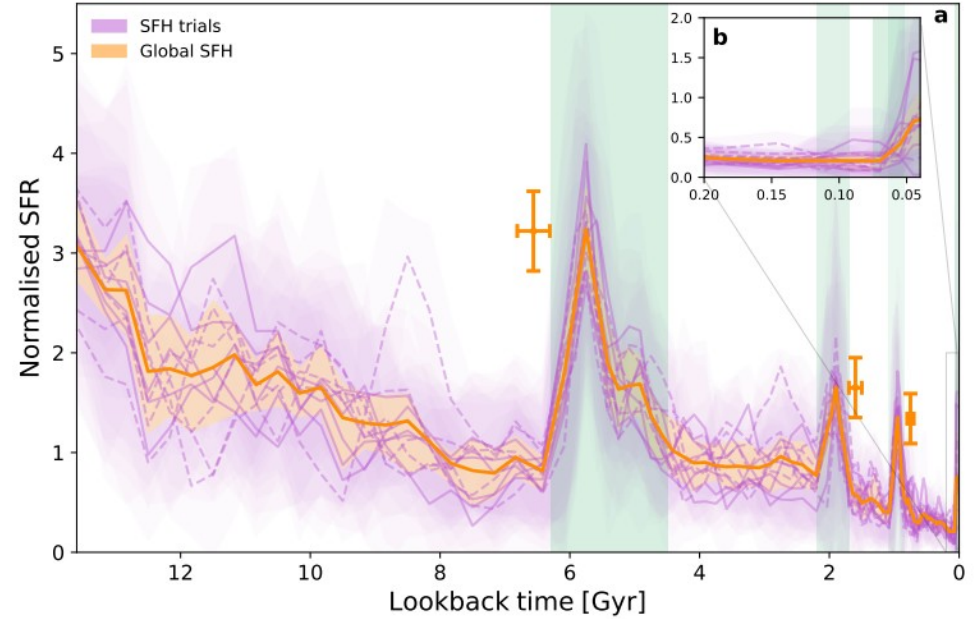
Obtaining SFHs from CMD fitting is a technique widely applied to study the evolution of Local Group galaxies

Pioneer works: Bertelli+1992; Gallart+1999; Hernández+1999; Dolphin 2002; Aparicio&Gallart 2004; Cignoni&Tosi 2010

RESULTS I

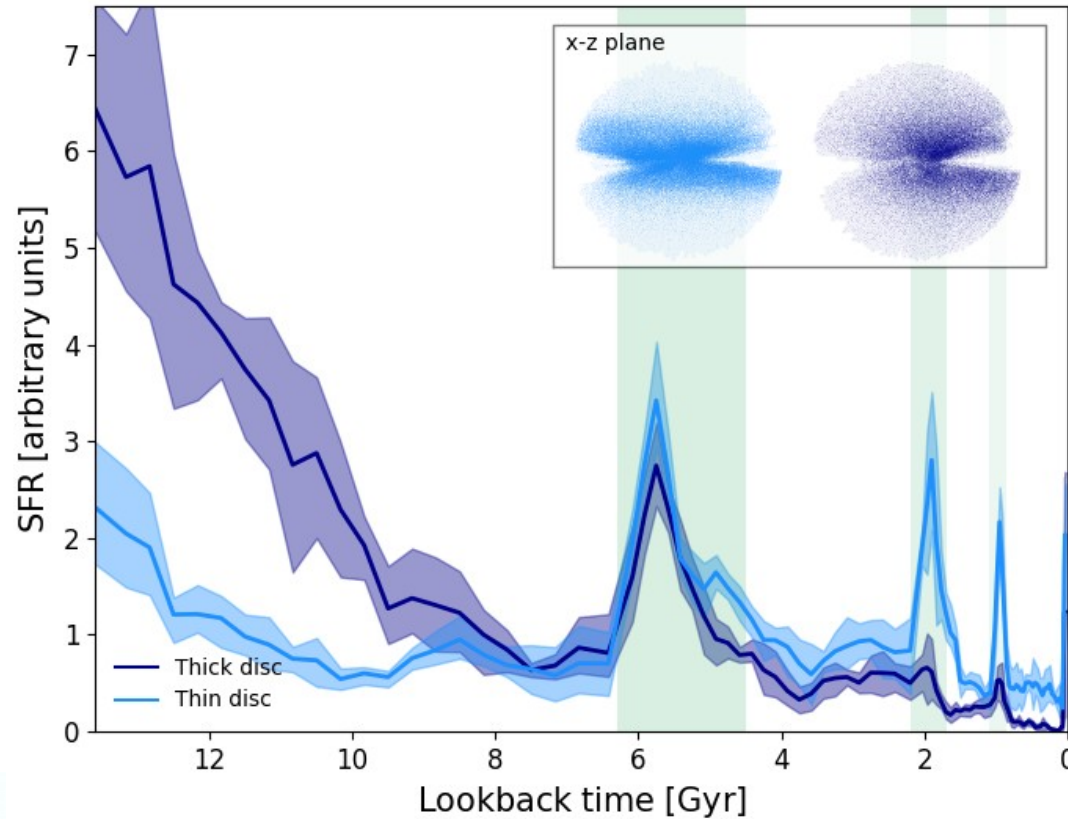


*** Sgr pericentric passages
 — Time intervals
 ■ Star Formation Histories



RESULTS II

Kinematic cut of thin and thick disc according to Babusiaux et al. 2018.



First infall global impact

Rest of passages affect more drastically the thin disc. Mixing effects?

CONCLUSIONS

- We have adapted **CMD fitting techniques** (commonly applied to dwarf galaxies in the Local Group) to deal with **Gaia data**
- This allows us to determine **Star Formation Histories** in **large volumes** within the **Milky Way** → **Age distributions**
- We have computed the **most detailed SFH** characteristic of the disc of the Milky Way → **Striking burst of star formation** (5.7, 1.9 and 1 Gyr ago)
- These findings most likely suggest that **Sgr** has been an important **actor in the build-up of the Milky Way disc stellar mass**, with its perturbations repeatedly triggering major episodes of star formation (constraining hydrodynamical simulations of interaction-induced star formation in galaxies)