

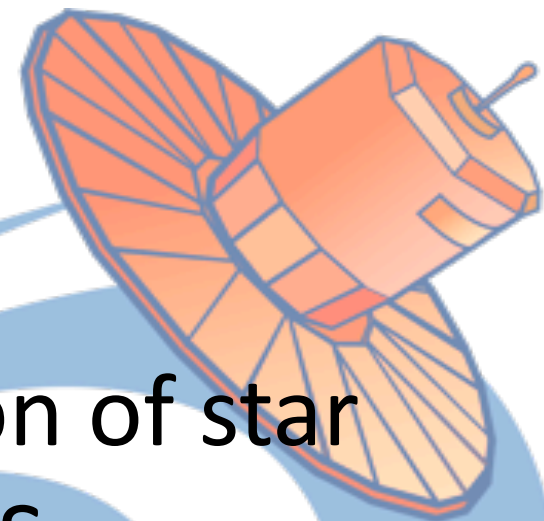


Formation and early evolution of star clusters with the Gaia-ESO Survey

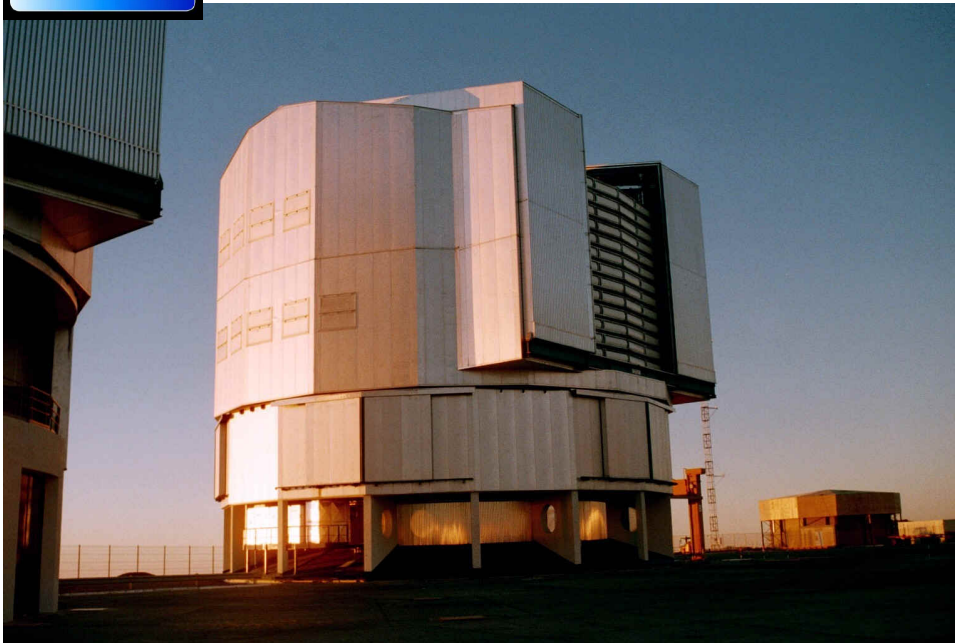
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GaiaESO



The Gaia-ESO Survey: overview



Aim: provide complementary data to Gaia (RV, $v \sin i$, T_{eff} , $\log(g)$, chemical abundances) by high resolution spectroscopy

Science goals:

- Galaxy chemo-dynamics
- Cluster formation and evolution
- Stellar evolution

(Gilmore et al. 2012, Randich & Gilmore 2013)

<u>Time & people</u>	<u>Sample</u>	<u>Instrument</u>
Pls: G. Gilmore & S. Randich Co-Is: +400 Start: 31/12/2011 End: 31/03/2017 Nights: 340	10^5 stars at $R=20,000$ ($V < 19$ mag) 5000 at $R=47,000$ ($V < 17$ mag) Milky Way components Old clusters (age > 100 Myr) Young clusters (age 1-100 Myr)	FLAMES@VLT • GIRAFFE (10^5 stars) (132 fibres at $R=20,000$) • UVES (10^4 stars) (8 fibres at $R=47,000$)



Star clusters dynamics with GES



Open questions:

1. What are the physical mechanisms driving the formation of young star clusters?
2. How do they dynamically evolve?
3. Why do star cluster remain bound or disperse in the field?

<u>Young cluster sample</u>	<u>Target selection</u>	<u>Astrophysical Parameters</u>
Observed cluster: 15 Age range: 1-100 Myr Distance: 100-2000 pc High mass and low mass clusters Gas free and embedded	Giraffe: based on photometry, common strategy for all the clusters UVES: priority to know members, aimed at deriving chemical abundances	Radial velocities ($\Delta RV \sim 0.3 \text{ km s}^{-1}$) Rotational velocities Stellar parameters (T_{eff} , $\log g$) Accretion and activity indicators Chemical abundances



Main results so far



1. Discovery of new complex system composed of two clusters with very different dynamical properties that are probably merging (Jeffries et al. 2014, Sacco et al. 2015, Mapelli et al. 2015)
2. All observed young clusters are characterized by the presence of multiple kinematic substructure (Jeffries et al. 2014, Sacco et al. 2015, Rigliaco et al. 2016, Sacco et al. in prep.)
3. In low-mass embedded cluster the velocity dispersion of the stellar population is much higher than pre-stellar cores (Rigliaco et al. 2016, Sacco et al. in prep.)

More about these results in Symposium 9 “The Dynamics of Star and Planet Formation” on Friday at 9:30