

Stelle e formazione stellare

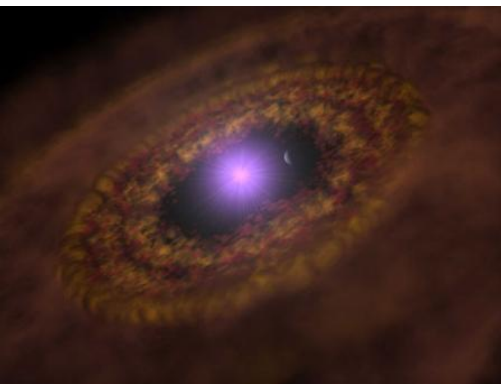
Just as the history of life was deduced by examining rocks, we expect to deduce the history of planet formation, star formation, and our Galaxy by examining stars. Stars record the past in their ages, properties, compositions, and in their kinematics

What Stars? What for?



Small and big scales; stars and clusters;
young and old; solar twins → brown dwarfs

Main Questions:

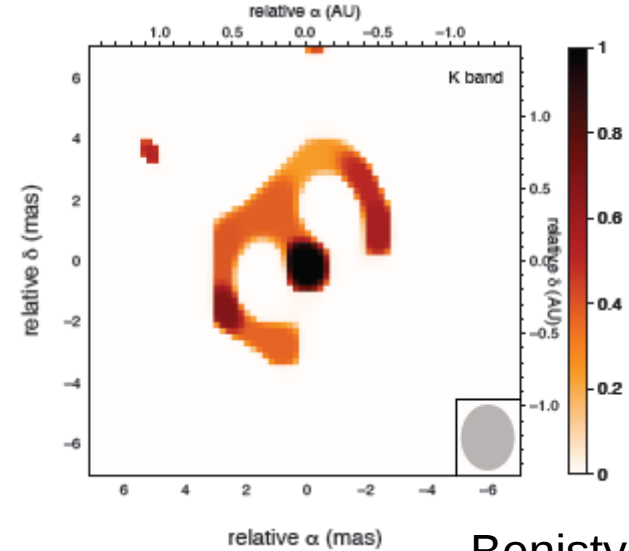
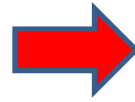


- How do planets, stars, clusters form?
- IMF? SFH? SFR? Now and in the past
- Effect of environment (small & large scale, X-rays)
- What/when do clusters survive or disrupt?
- Processes affecting ev. and nucleosynthesis?
- How did the thin disc form and evolve?

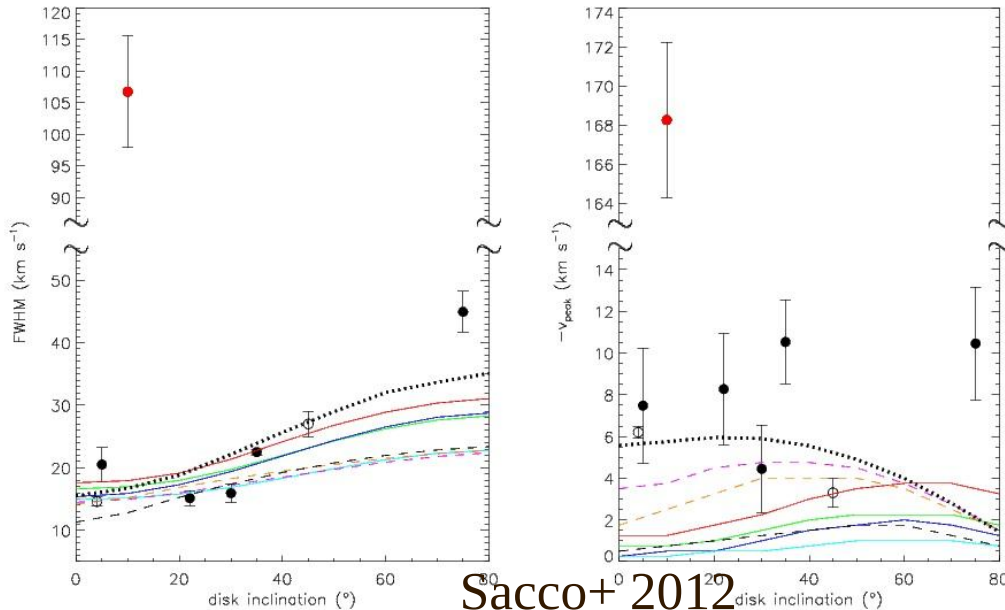
The sites of planet formation: protoplanetary disks

Interferometry with
Amber@VLTI GTO -218hrs
(Natta, Bacciotti, Massi, Testi
E. Tatulli, M. Benisty, A. Isella)

K band image reconstruction



Benisty+ 2011



Sacco+ 2012

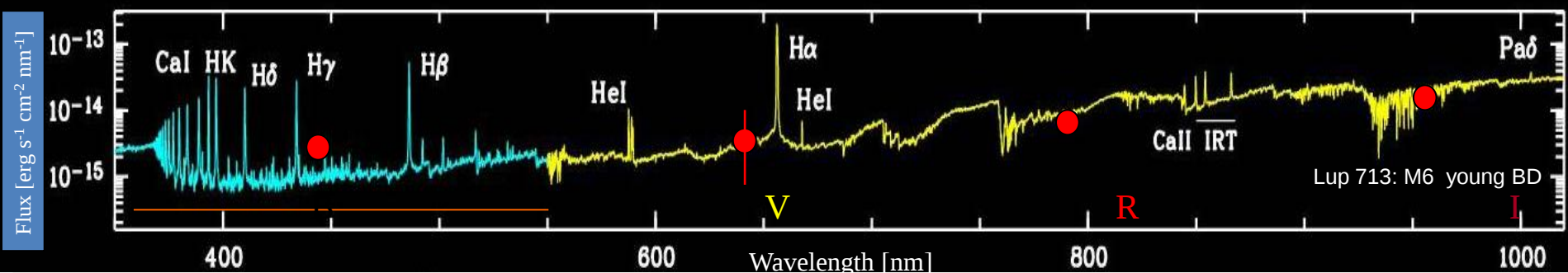
VLT/VISIR Spectroscopy of
[Ne II] 12.81 μ (warm gas) $\rightarrow$
Spatial and thermal structure
of gaseous component of
circumstellar disks
Photoevaporated wind

X-Shooter GTO survey in SFRs

$\sim 10^4$ K post-shock gas emits in:

Rigliaco+2011; Alcalá + 2011

- Balmer & Paschen continua
- Balmer & Paschen series
- CaII IRT, He I



60 objects in nearby SFRs + 4 stars in LMC

Goals:

- distribution of mass accretion rate vs. stellar/BD mass
- outflows in very low-mass YSOs
- Physics of accreting and outflowing gas
- Accretion in low metallicity environment (YSOs in the LMC)
- Observations fit traditional low-mass star/BD formation scenario ?

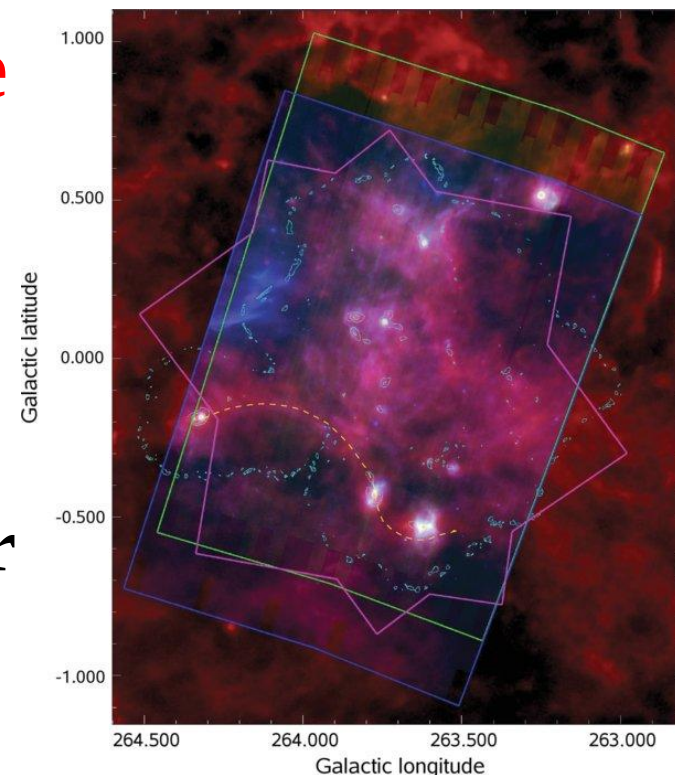
X-shooter national PI: S. Randich
SF GTO PI: J.M. Alcalá'; S.Randich
Arcetri: Natta, Bacciotti, Testi
Rigliaco
Funding from INAF FFO

Young embedded star clusters in the Vela

Molecular Ridge

- **Origin of the Initial Mass Function**
- **Cluster Mass Function in large SF complex;**
- **Do massive stars form only in large clusters, or can they arise in smaller clusters as well?**

F. Massi, L. Olmi, C. Codella, L. Testi
(PRIN-INAF 2009)



MIPS 24,70+BLAST 250 micron (Olmi et al. 2009)

ISAAC@VLT, 4 hrs (2004)
Sofi@NTT ,7 nights (2005-2007)
IRAC,MIPS@Spitzer, 11.3 hrs 2006-2007
IRAC@Spitzer, 4 hrs 2009
MMIRS@Magellan, 2 half nights, 2010

JHK Sofi view of the embedded cluster IRS22



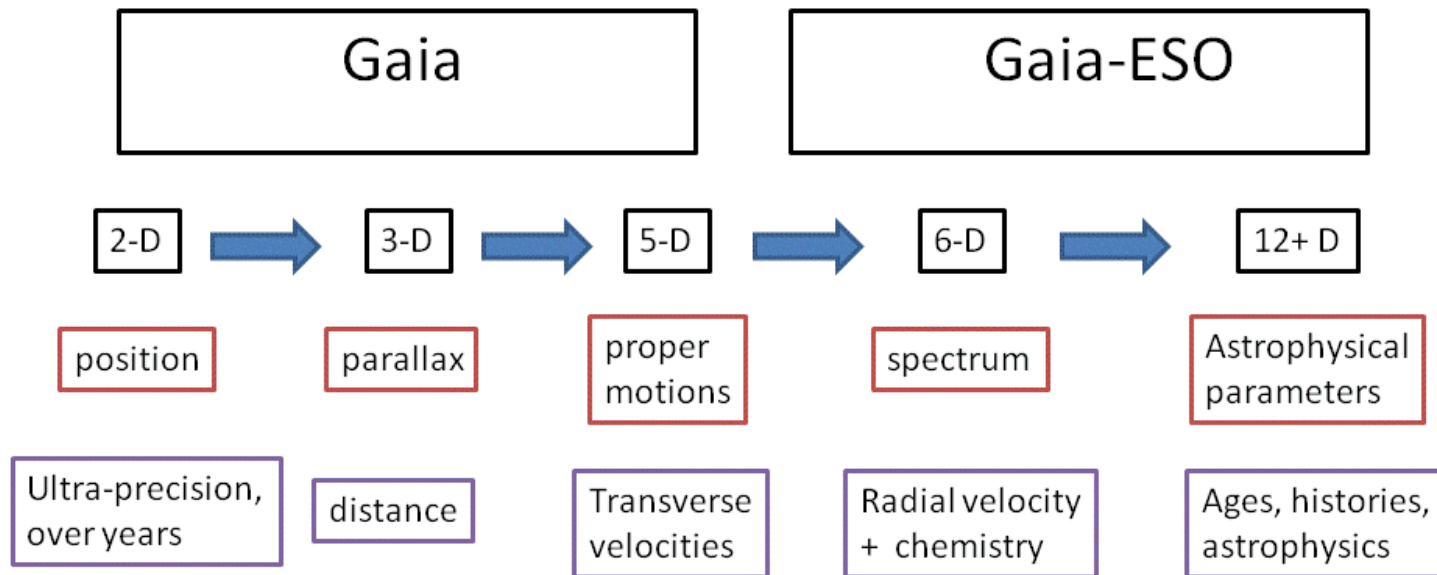
Gaia-ESO Public Spectroscopic Survey

- **300 nights** assigned on a competitive basis, on **VLT/FLAMES** (Giraffe & UVEs); 2012-2017. Obs. started on 31.12.2011 – typically 5 nights/month
- **Survey Co-PIs: G. Gilmore & S. Randich.** 300 CoIs, 50 from Italy, **6 from Arcetri**
- Homogeneous, high quality **spectroscopy** of **all main components of MW** –halo, thin/thick discs, bulge, 100 open clusters sampling the accessible cluster ages and stellar masses
- Precise **RVs**, astrophysical parameters, abundances for **100,000 stars: complement Gaia and viceversa**

Top level Survey goal

Synergy with Gaia

The formation and evolution of the MW and its component stars and stellar populations



Stellar orbits, cluster kinematics/dynamics, star formation history, cluster formation and evolution, origin of the elements, Galaxy assembly, stellar evolution...

Arcetri involvement

- All UVES data reduction, radial velocities (Franciosini, Morbidelli, **Sacco**)
- Cluster selection (Franciosini, Palla, **Sacco, Spina**). Coordination of old cluster selection (**Magrini**).
- FGK spectrum analysis (**Magrini**, Randich)
- PMS spectrum analysis (Franciosini, Randich, **Sacco, Spina**)

Funding from PRIN-INAF 2011 requested

GRAZIE