The HWO perspective of the Italian JEDI collaboration

On behalf of the JEDI group:

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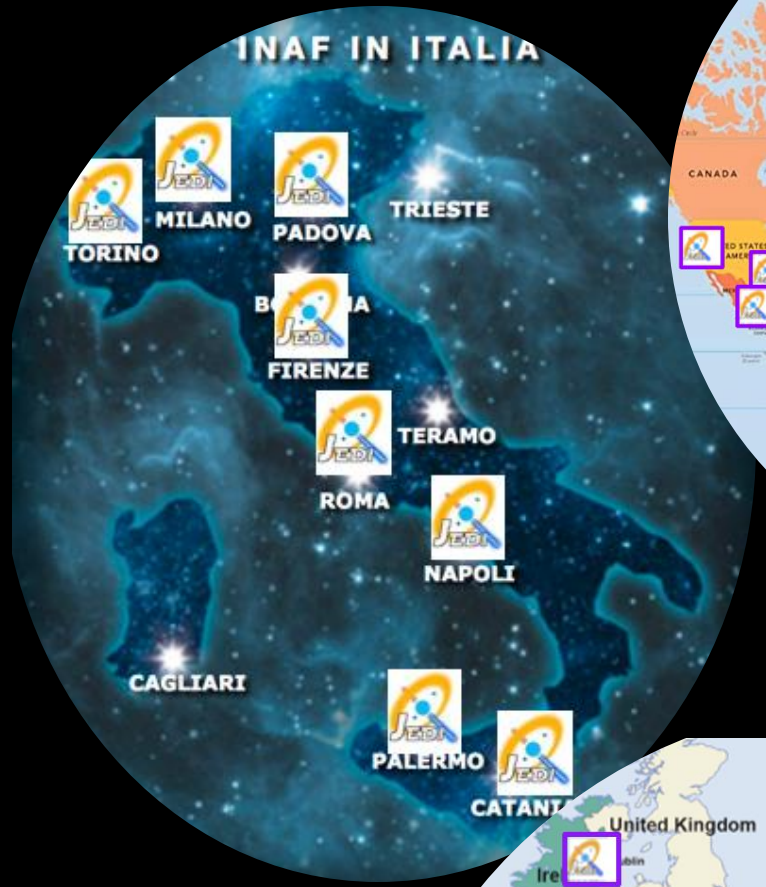
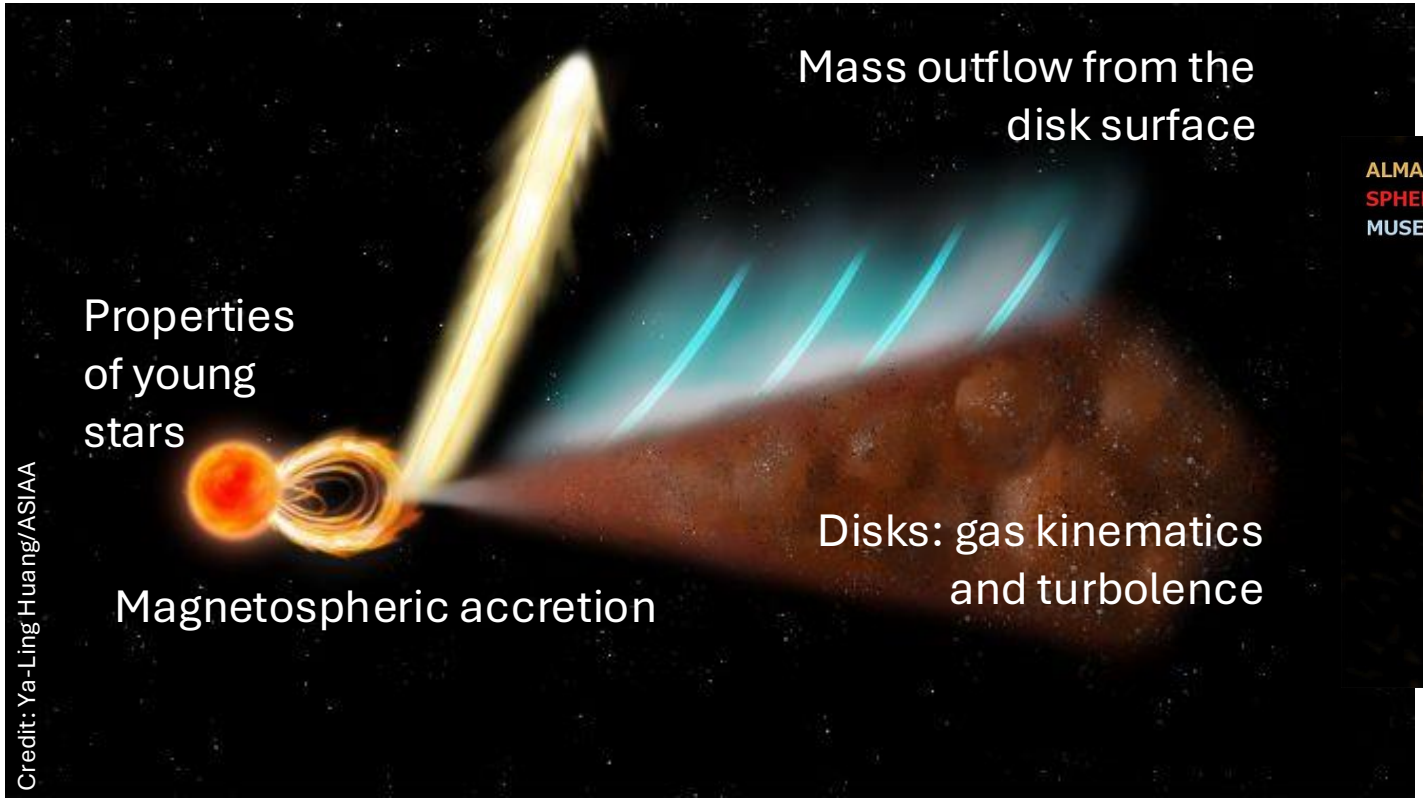
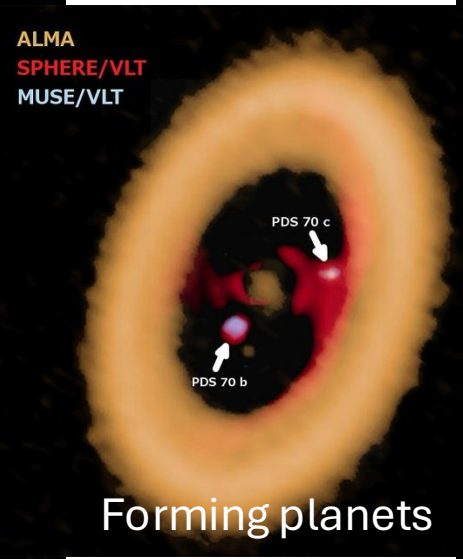
The JEDI national and international collaboration

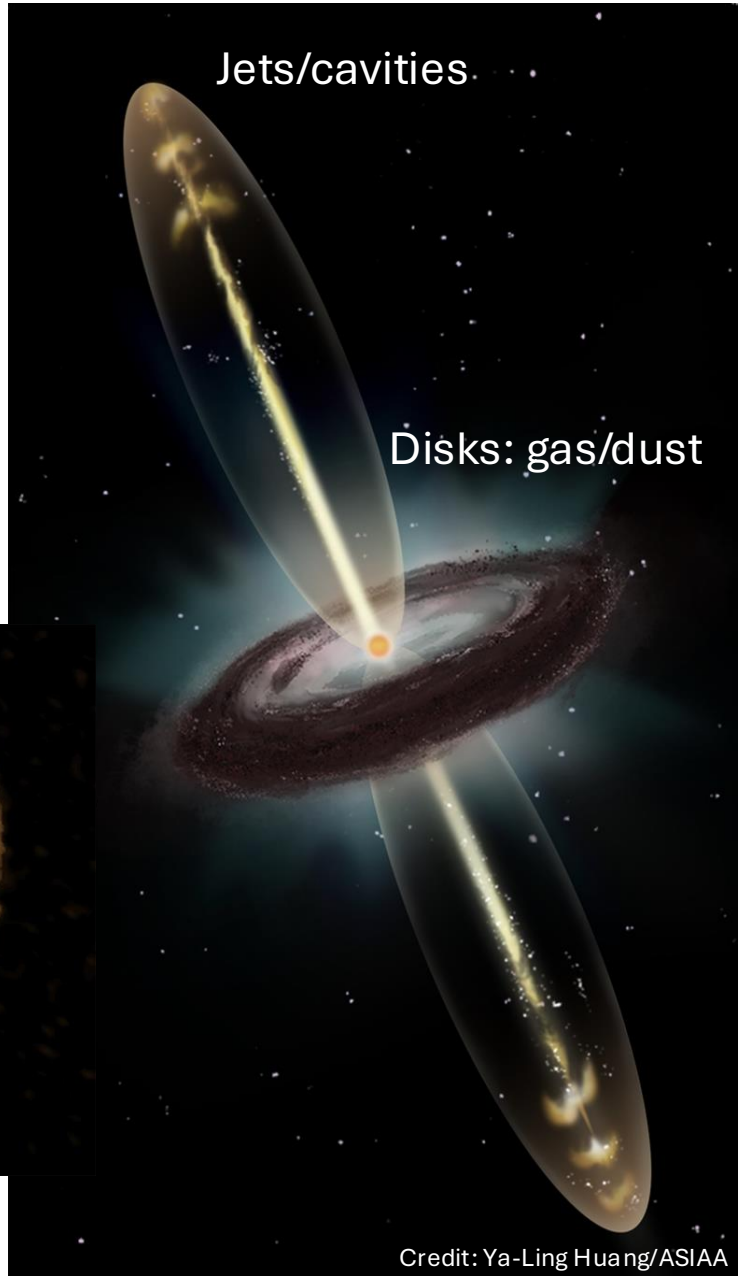


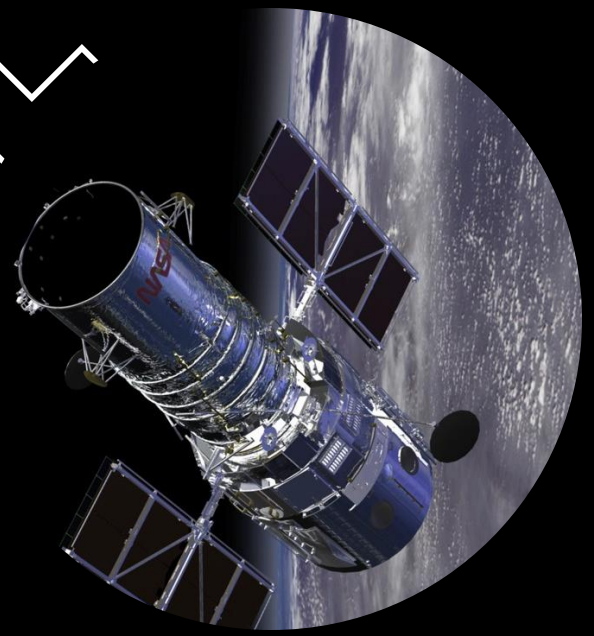
More than 40 JEDI knights,
and several JEDI collaborators

JEDI Scientific Interests









$2\frac{\lambda}{D}\,HST = 80\ mas\ (@500\ nm)$

$2\frac{\lambda}{D}\,HWO = 25\ mas\ (@500\ nm, D = 8m)$

Major gain factors for our community:

UV regime
high-sensitivity and multiplexing in the UV
high-contrast for proto-planets search

Where we can have a real gain in the “side-science” made by the JEDI with respect to what we have now and we will have in the next 20/30 years?

HWO and the accretion onto young stars

Science topic: measuring accretion onto young stars via the UV Balmer Jump or U-band photometry

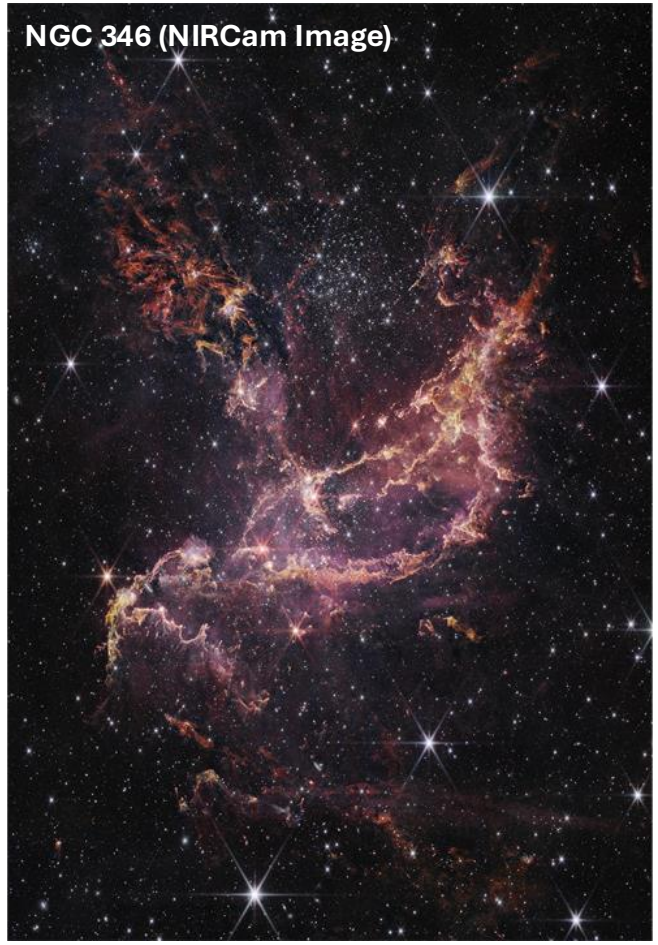
Open question(s): how does accretion in low-metallicity environment affect disk evolution and planet formation? – looking at the OUTER GALAXY (Magellanic Clouds)

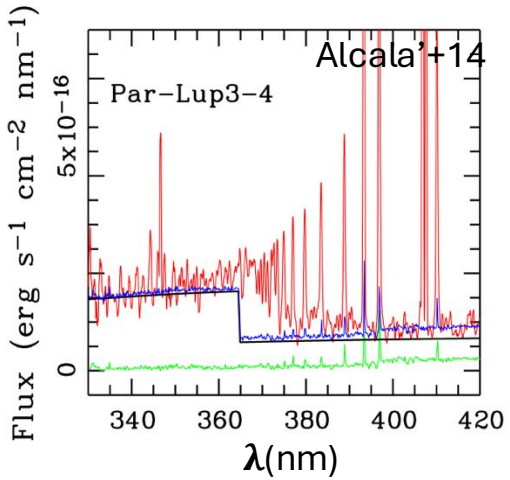
limiting factor(s): Resolution. Distance. Sensitivity.

Example: Magellanic Cloud - distance ~ 50/60 kpc → R~900/1000 au

Boost with HWO: Higher spatial resolution and high sensitivity in UV band

Basic Intrument requirements: UV coverage of the Balmer Jump (Near-UV wavelengths)





Unique science case for HWO (Not-doable with ELT – UV-coverage not provided)**:**

Measuring accretion in stars in low-metallicity environment → boosting our understanding in planet formation (planet/metallicity correlation)

HWO and the jet launching regions

Science topic: Exploring the jet launching regions around young, low-mass stars

Open question(s): what is the mechanism driving the removal of mass and angular momentum through jets?

limiting factor(s): spatial and spectral resolution

Boost with HWO: probe the base of the jet using UV diagnostic lines (e.g. MgII @ 2796,2803, Lyα)

Basic Intrument requirements: IFS, NUV, spatial and spectral resolution (R>~3-5000)

Typical SFR – distance ~150 pc, → R~2/3 au

Best case scenario (e.g., Lyman H_2 band emission @150nm)

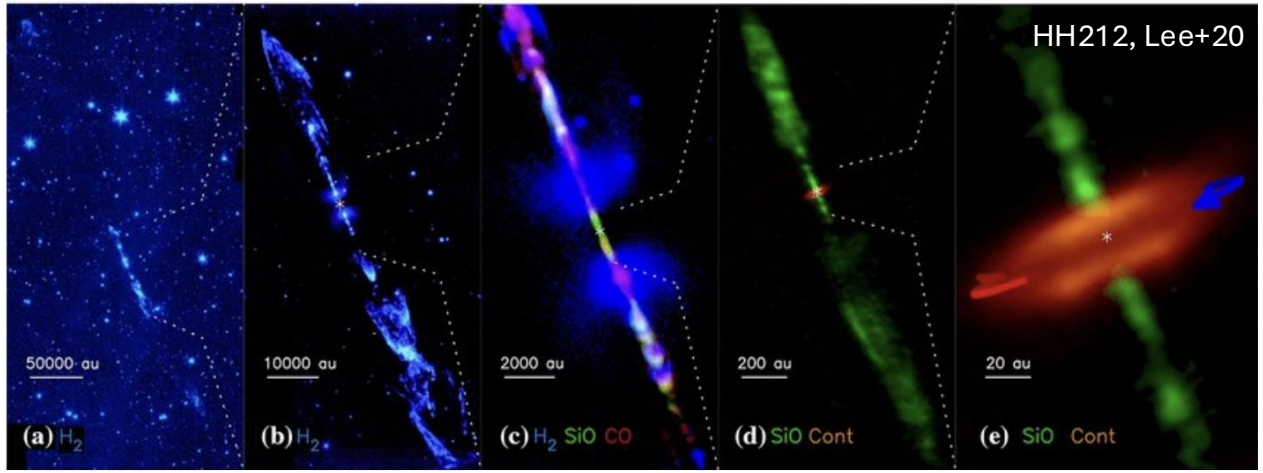
$2\frac{\lambda}{D} HWO = 7\ mas\ (@150\ nm, D = 8m, d = 100pc)$

→ R=0.7 au

→ spatially resolve the region within 2au

Unique science case for HWO:

Being able to resolve the region within 1 au (in the best case scenario)



HWO and the accretion onto forming planets

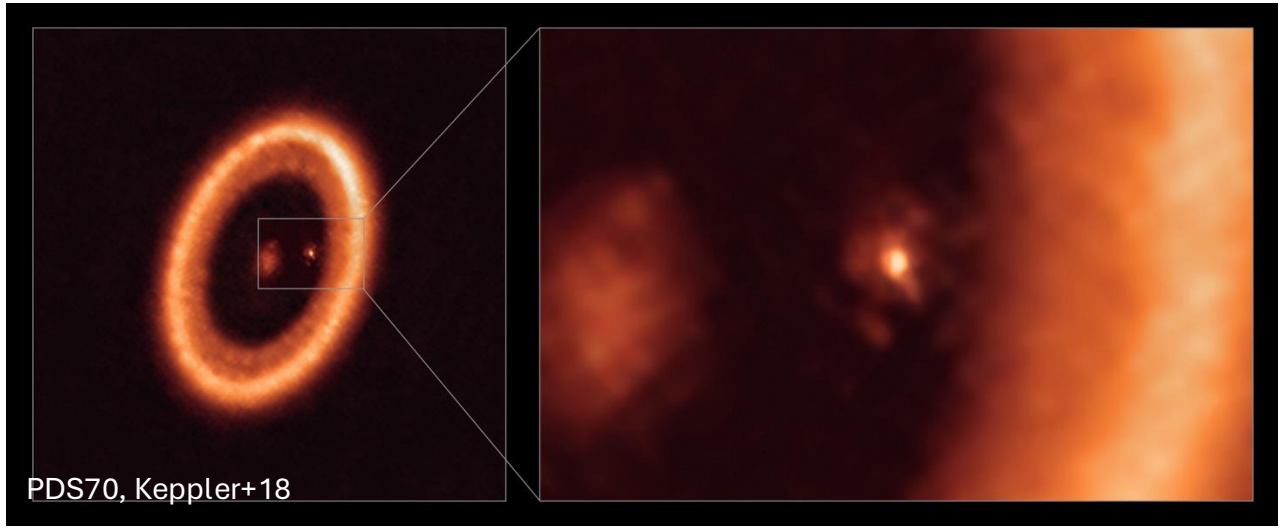
Science topic: measuring accretion onto protoplanets using Balmer/Paschen hydrogen lines (UV-Optical-NIR)

Open question(s): Do proto-planets form through magnetospheric accretion, as Sun-like stars?

limiting factor(s): limited number of objects observed SO FAR (many(?) more to come (SHARP? PCS?)) - dust absorption

Boost with HWO: more time available to discovered other targets; high-contrast (10^{-10} → see accreion on Hα)

Basic Intrument requirements: UV coverage of the Balmer Jump (extinction?) – NIR – High-contrast (up to 10^{-10})



JEDI And HWO

3 “side” science cases unique for HWO:

- Accretion onto young stars moving to the outer galaxy
- Exploring the jet launching regions arounf young stars
- Measuring the accretion onto forming planets