Galaxy Evolution with 30±10m Telescopes

Debriefing from IPMU
Rebriefing in Rome

(Alvio Renzini)

They will all come on line after (several) years of JWST operations will have transformed the field

Galaxy Evolution with 30±10m Telescopes

Their advantages over JWST

- Higher spatial resolution in imaging and slit & IFU spectroscopy
- Access to shorter optical wavelengths
- Higher spectral resolution
- Wider FoV (and multiplex?)
- Lifetime
- Did I forget something?

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The problems we wish they will solve (if JWST did not):

- First galaxies and reionization
- Galaxy-SMBH coevolution
- Baryon cycle (in and out of galaxies)
- Relative weights to the various SF quenching channels
- Giant colorful posters of high-z galaxies with ~30pc resolution (3D)
  ~1000 resolution elements per kpc^2
- Did I forget something?

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Three telescopes, each with limited instrumentation (2-3 each).
Competition with a bit of collaboration?
Best/exclusive capabilities of each of them, e.g.:

- Widest FoV → GMT
- Northern Hemisphere → TMT
- Highest spatial resolution → ELT
- UV response → TMT
- Largest collecting area → ELT

- Grassroots intercontinental collaborations to orchestrate their usage for problem-solving observations.
- Did I forget something? Yes ….

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- Did I forget something? Yes …. to some extent these telescopes will transform us! i.e., our way of carrying on Large Programs.

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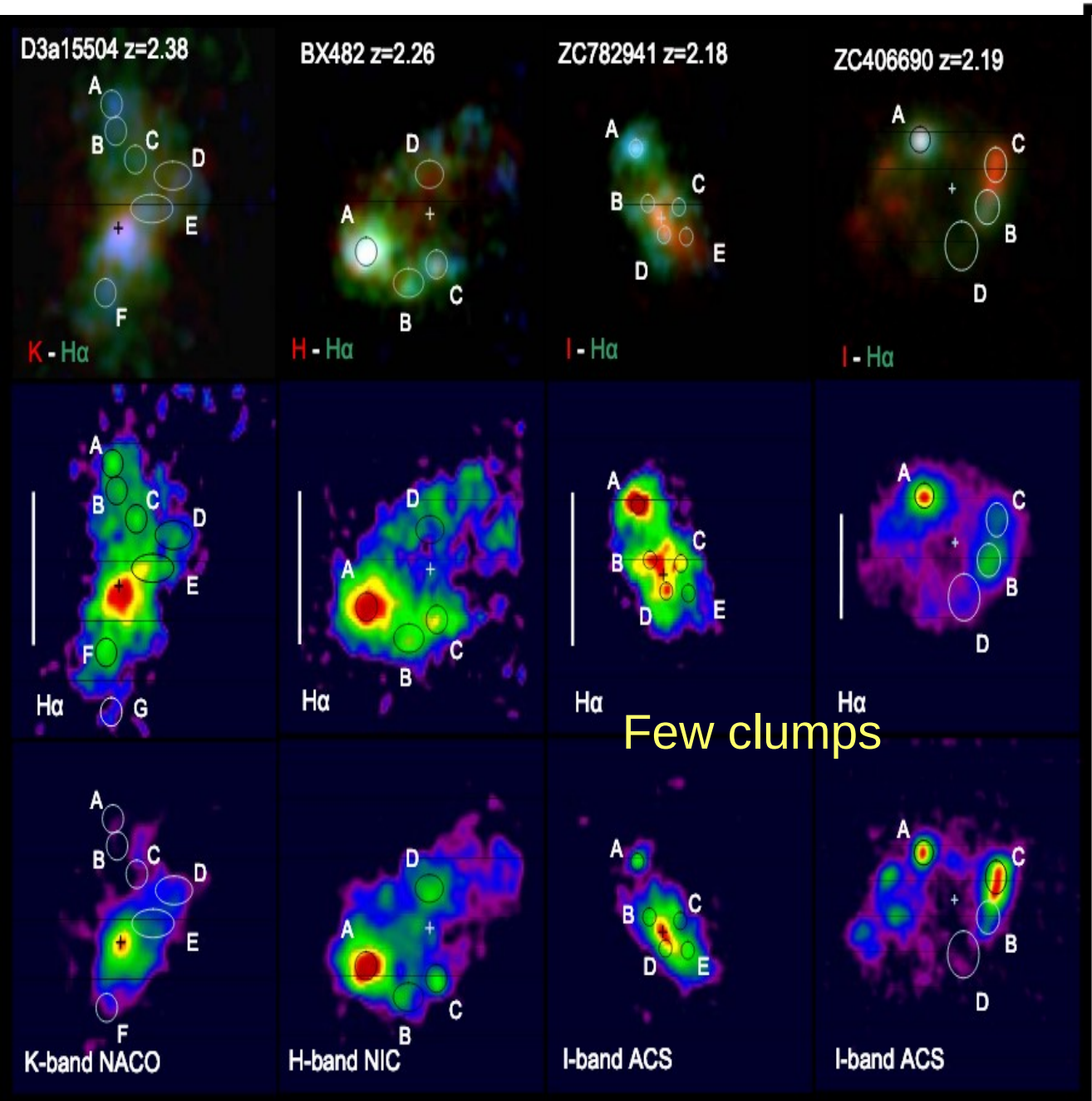
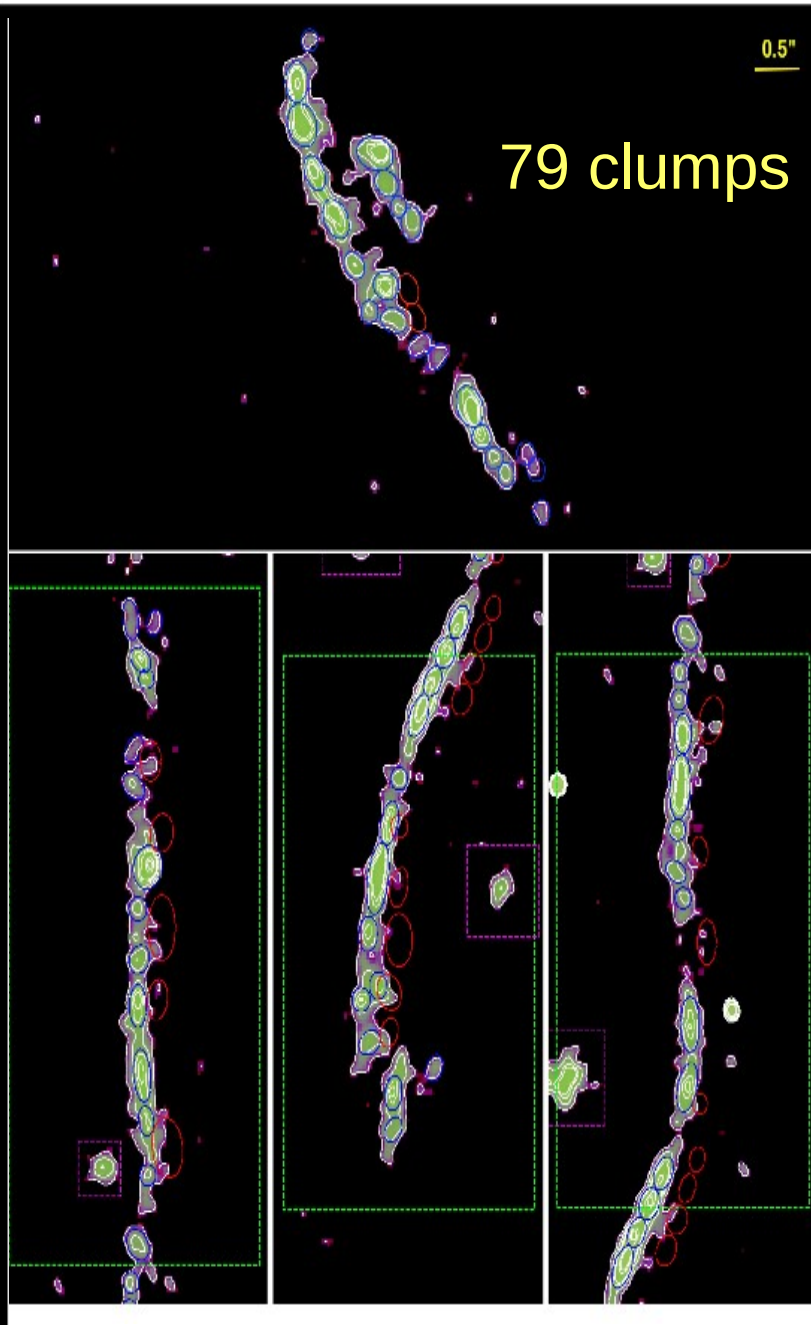
Science requirements:

- Needs for high spatial & spectroscopic resolution + IFU on single targets seem finely met by first generation instruments
- Needs for high multiplex spectroscopy not met quite as well ...
- “Instruments need to have high multiplex in order to exploit the higher target densities” (KG Lee)
- “Difficult to have high multiplex and multi-IFUs in the same instrument” (M Akiyama?)
-
- Did I forget something?

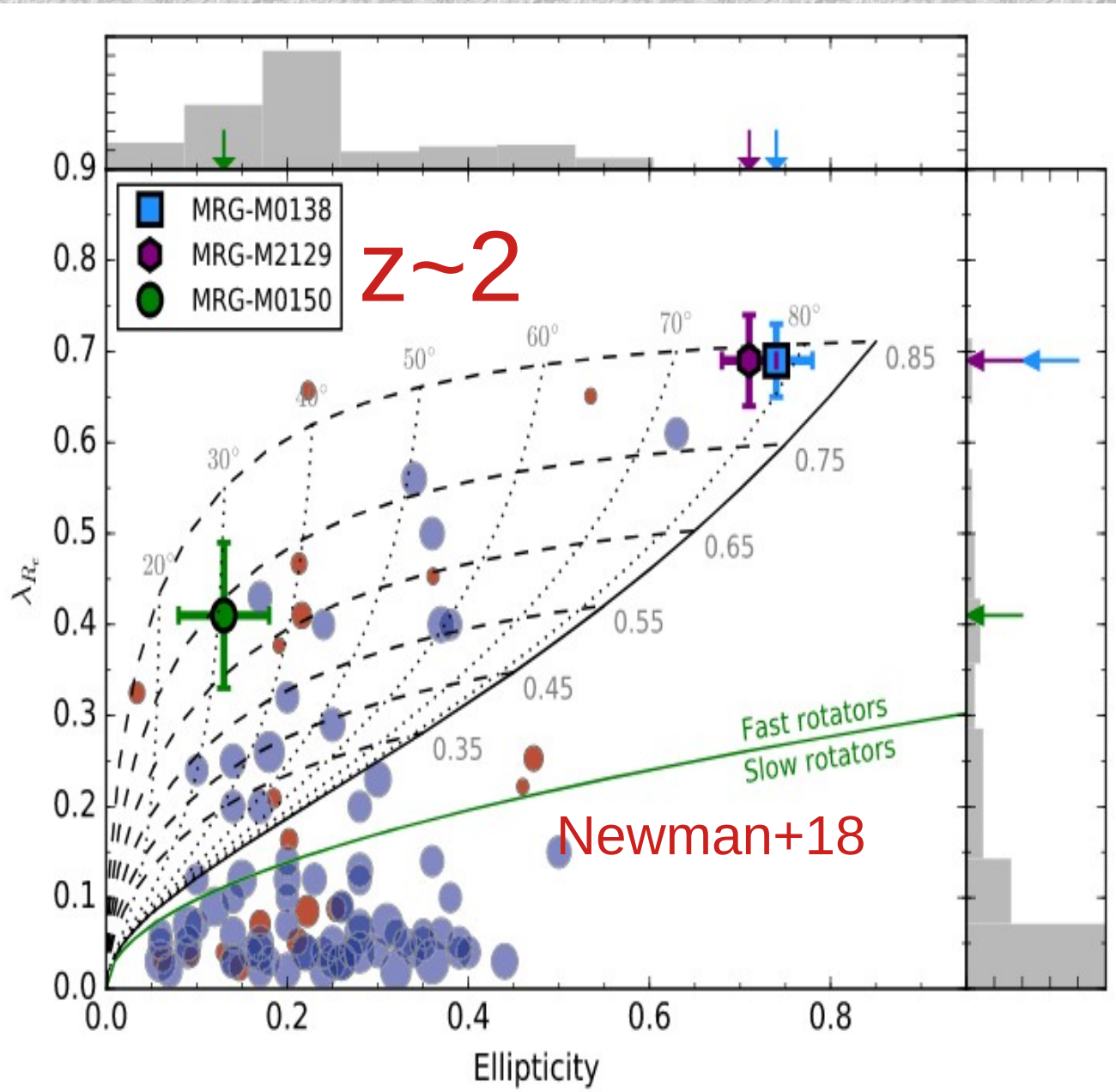
What is now possible only thanks to magnification and stretching by Gravitational Lensing will become possible for unlensed high redshift galaxies: two examples

~1kpc, Genzel+11 Spatial Resolution ~30pc, Cava+18





No Morpho Change at Quenching (!)



Space-resolved 1D and 3D spectroscopy of freshly-quenched, high redshift galaxies

See also Toft+17


Thank You!