What's new in the next decade on:

1) (Origin and) fate of galaxies
2) Census and distribution of mass/energy on LSS

largely based on MA1 WG document

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1) Origin and fate of galaxies

Galaxies are complex systems living in dynamical environments. Understand their evolution requires to control:

-cosmic time

-environment

-(stellar, atomic, molecular, dark) mass

-halo growth history

-AGN activity … and more

What's new in the next decade?

NB. An informed choice of the shopping list in the MA1 WG document, to trigger a discussion

1) Spatially resolved spectroscopy at mid to hi-z. A detailed picture of the stellar and (multi-phase) gas kinematics, gas inflows and outflows in both high-z and mid-z star-forming galaxies and its connection with the circum-galactic and inter-galactic medium is becoming accessible thanks to spatially resolved (optical/IR/radio) spectroscopy [ELT, ALMA, MUSE@VLT, WEAVE, SKA and its precursors].

2) Molecular content of normal galaxies. Molecular gas reservoirs typical of galaxies with normal star formation rates and masses can be measured up to z~2 and beyond as well as the dust content up to z~6, providing key on the baryon cycle and re-cycle [ALMA, JVLA, IRAM PdBI & NOEMA].

3) Statistical studies of the HI content of galaxies and its evolution with cosmic time will finally become feasible through next-generation surveys of the 21cm line [SKA and its precursors].

4) Central regions of massive early type galaxies at z>0.8 and beyond will become observable thanks to the improvements in resolution, probing the connection between them and the size/mass growth of galaxies [JWST, ELT].

5) (Proto)clusters at the peak of the cosmic star formation rate (z~2) start to be detected in sizeable numbers and are being observed with sufficient level of detail to study their member galaxies at a critical phase of the cluster assembly [VISTA, EUCLID].

6) Astrostatistics and Astroinformatics. Because data/model complexities and, often, large datasets, addressing these questions is inextricably interlinked to these disciplines.

2) Census and distribution of mass/energy on LSS

- alias: how the gravitational energy shapes the cluster assembly, and how, and in which fraction, it is converted into thermal and non-thermal components, producing turbulence and kpc-scale bulk motions.

What's new in the next decade?

Disclaimer: partly read between the lines of the MA1 WG document

1) No new X-ray facilities. Somewhat static subject, with very few exceptions (e.g same analysis, but different sample selection).

2) New radio observations of clusters are becoming qualitatively different (more sensitive, more detailed) -> turbulence, shocks, merging, accretion

3) New SZ powerful machine (like NIKA2@IRAM) ->thermodynamical properties outside the reach of current X-ray data

4) Anything new to add?

Hoping having triggered a (profitable) discussion …