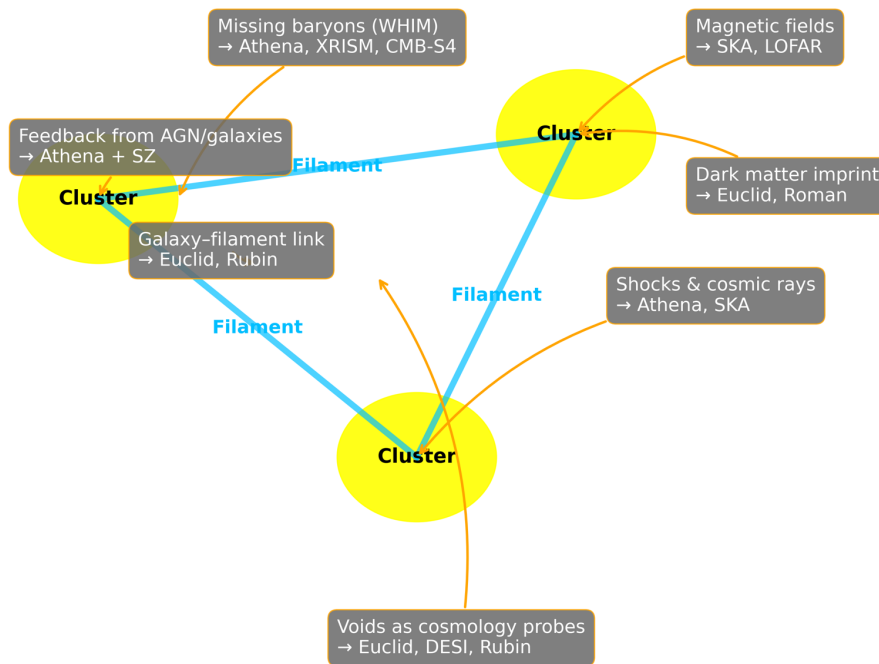


Welcome

- Lunches / coffee-breaks / dinners; *social dinner on Thursday?*
- Please provide PDF of your presentations to be posted on the site
- The program is very flexible and does not follow a fixed schedule; please consider a (max) 45' talk; questions are welcome during the talk to foster clarification, discussion, and interaction

Focus Week: “The astrophysics of large-scale structures in the era of *eROSITA*, *Euclid*, *SPT-3G*: *the emergence of the cosmic web*”

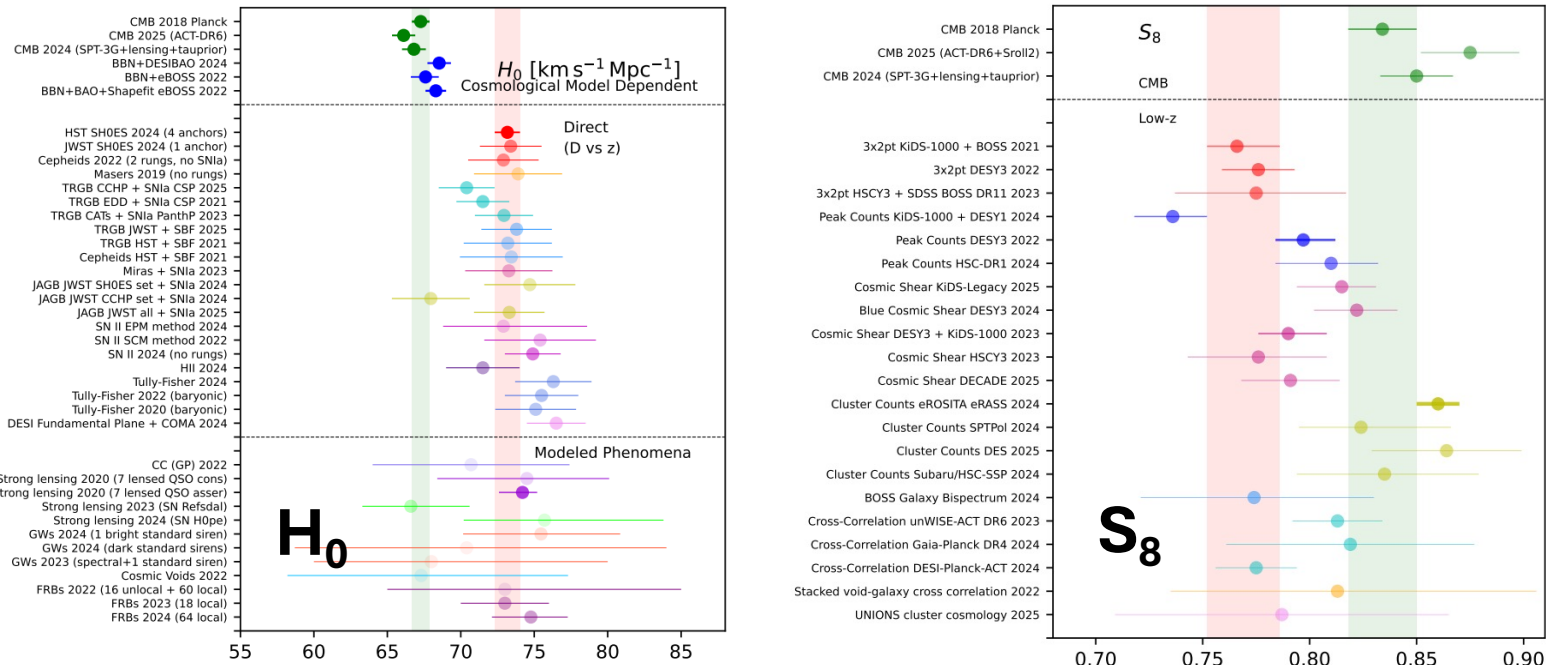


*with a focus on the **environment** in which collapsed objects exceeding $1e13$ solar masses and existing up to redshift 2+ form and evolve*

Focus Week

- Aghanim/*filaments*, Di Mascolo/*sz*, Pisani/*voids*: for personal reasons, they cannot be here; we did not succeed in covering the *magnetized/non-thermal* part
- Friday
 - 10-11:30, round table: consider to extend activities with other meetings (e.g. EAS 2026) / workshops (e.g. MIAPP 2027, KITP 2027); deadlines: end of Sep/mid Oct
 - 11:30, seminar by Popesso on *A CLEVeR view on “halo baryonification”*: *from galaxy groups to massive clusters*

The context: we live in a Λ CDM world with *tensions*



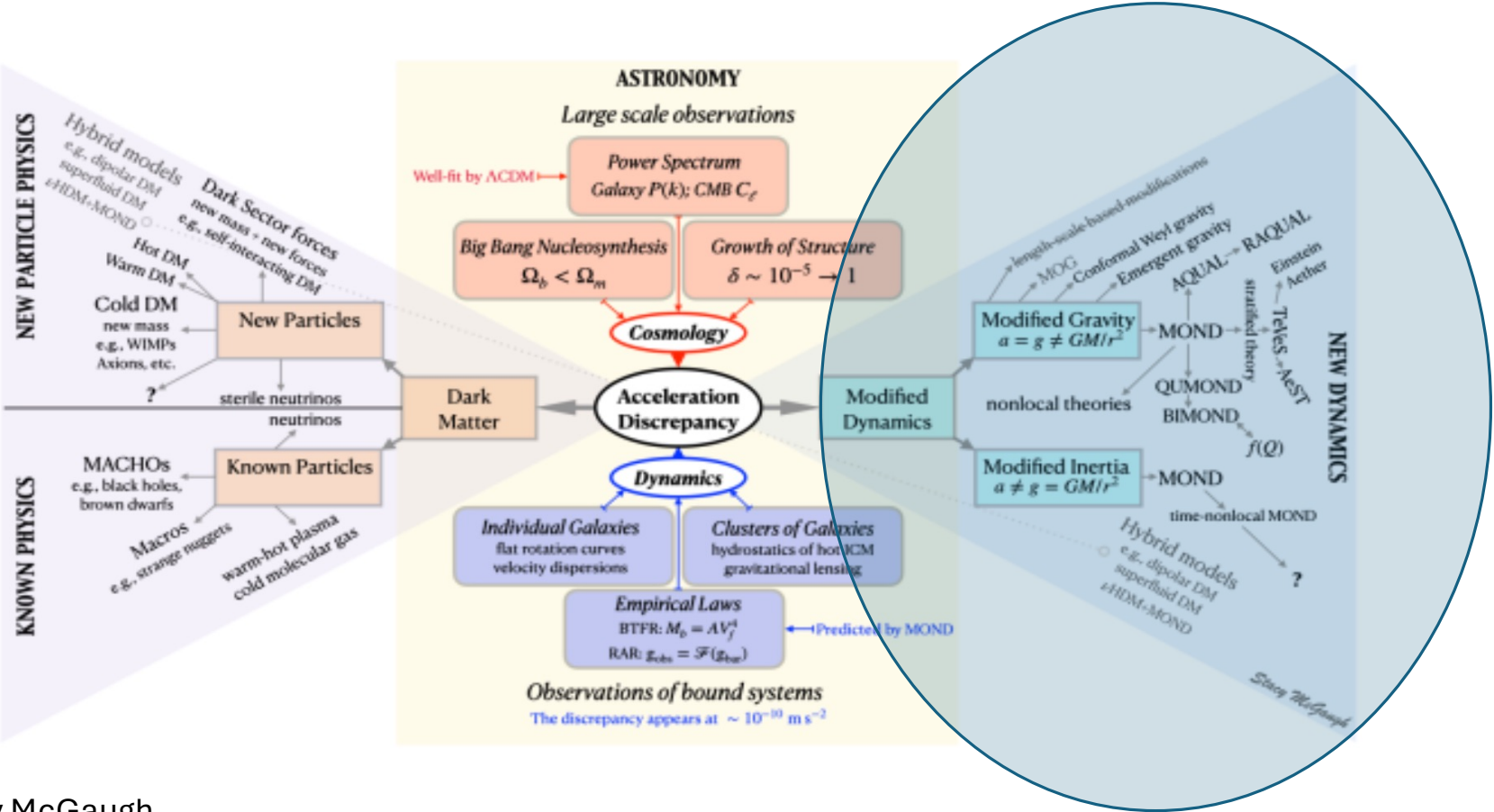
(from *CosmoVerse 2025*) Other tensions ($\sim 2-3\sigma$): A_{lens} anomaly; Evidence for nonzero curvature; CMB anisotropic anomalies; $w_0 w_a$ tension; Neutrino masses from cosmological data and terrestrial oscillation experiments; Cosmic dipole anomalies; BBN anomalies; Ly-alpha anomalies; ISW and cosmic superstructures; Cosmic voids anomalies; FRB probes; excess in radio bkg; higher amplitude in bulk flows; Ultra Long Period Cepheids; ...

In looking at the nature of DM, DE, and cosmic structure formation, **do we need to move beyond the minimal Λ CDM?** Potential solutions are not unique...



@CosmoVerse

And even more fundamentally: **do suitable dark matter particles exist, or are they a modern æther?**



@Stacy McGaugh

A personal note: I am still under the influence of attending a workshop on MOND (→ reading reversely, and shifting a letter: NO-DM...): *a lot of nice predictions/measurements based only (mostly) on baryons and the modification of a law*

(and finding a very active community, outside the mainstream, aware of its position, and because of that, pushed to be quite smart ;-)

“MOND whispers like the Sith... but Λ CDM shines like the Jedi”

So, please help me to forget about this *dark force* with *bright electromagnetic evidences of the astrophysics of large-scale structures and of the emergence of the cosmic web in the context of Λ CDM*

Cosmic web: while **dark-matter skeleton** is well predicted and simulated, the **baryonic, magnetic, and dynamical aspects** -including how gas, galaxies, and feedback processes interplay with the web- are still poorly constrained observationally, limiting the predictive power of simulations

Open Problem	Key Science Goal	Best-Suited Facilities / Missions
Missing baryons (WHIM detection)	Census of diffuse warm-hot gas in filaments (X-ray/UV/SZ signatures)	NewAthena (X-ray spectroscopy), Lynx (future X-ray), XRISM , HST/COS & future UV spectrographs, CMB-S4 (SZ effect)
Magnetization of the cosmic web	Measure origin/strength of large-scale magnetic fields via synchrotron and Faraday rotation	SKA (radio polarization), LOFAR , MeerKAT , ngVLA
Shock physics in filaments	Detect and map cosmic web shocks, particle acceleration	SKA (radio relics), NewAthena (X-ray shock fronts), eROSITA
Galaxy–filament connection	Understand how filaments regulate gas accretion, star formation, and spin alignments	Euclid , Rubin Observatory (LSST) , DESI , JWST (galaxy evolution), IllustrisTNG , SIMBA , Magneticum (simulations)
Dark matter imprint on web	Test warm/self-interacting dark matter via filament thickness/topology	Euclid (weak lensing), Roman Space Telescope , Rubin Observatory (deep lensing surveys), DESI (spectroscopy)
Voids as cosmological probes	Constrain dark energy, neutrino mass, and modified gravity with void statistics	Euclid , DESI , Rubin Observatory , SKA (21 cm intensity mapping)
Multi-scale baryonic feedback	Quantify AGN and galactic winds' impact on web gas distribution	NewAthena + CMB-S4 (X-ray + SZ synergy), Rubin (galaxy properties), high-res hydrodynamical simulations