# Chapters submitted by HI surveys FG members

- De Lucia: Neutral hydrogen at the crossroads of cosmology and galaxy formation
- Joel Mayor: Tully-Fisher peculiar velocity surveys + 1 (chapter update)

Known submitted chapters to HI SWG:

- Alejandro Benitez Llambay: potential of SKA in uncovering HI-rich, starless dark matter haloes in the Local Volume
- Federico Lelli: testing dark matter and gravity theories with HI dynamics
- Kristine Spekkens: Mapping HI Disks Across Cosmic Time: the Case for AA4
- Kenji Kadota: Differentiating Warm Dark Matter Models through **21cm Line Intensity Mapping**
- Daniele Bertaca: Observer's fingerprint in SKAO survey
- … Other relevant submissions are focused on EoR

**All Intensity Mapping submissions are considered to be managed by the Cosmology SWG**

**EoR related projects are managed by the EoR SWG?**

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## Synergies between SWG

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| Unveiling the Evolution of Luminous Red Galaxies- synergy between SKA and IR/Optical surveys | Luminous Red Galaxies (LRGs) are among the most massive elliptical galaxies in the universe, characterized by an old stellar population and quiescent nature. Thanks to their high brightness level, LRGs can be observed at large distances and play a crucial role in cosmology and large-scale structure formation and evolution studies. Furthermore, the studies of their stellar populations, redshifts, and chemical abundances from upcoming IR and optical surveys combined with gas dynamics (inflow-outflows), neutral hydrogen (HI) content, and radio emissions with the SKA, can reveal key details about galaxy formation and quenching processes through feedback mechanisms over cosmic timescale, thereby providing a holistic view of galaxies, tracing their evolution from star formation to quiescence. | ["Cosmology","Extragalactic Continuum","Extragalactic Spectral Line","HI Galaxy"] | | Mamta | Pommier | mamtapommier@gmail.com | University of Lyon |
| Tracing gas outflows in Molecular Hydrogen Emission rich galaxies with the SKA | Molecular Hydrogen Emission Galaxies (MOHEGs) are $H_2$-rich, massive AGNs characterized by large-scale radio jets, galaxy mergers, and shock-driven processes. AGN feedback, triggered by the extension of radio jets into the intragalactic medium, generates fast outflows of atomic hydrogen (HI) gas, the primary fuel for star formation. The presence of this gas can be traced through 21-cm absorption line observations, providing valuable insights into gas kinematics, location, and origin within the AGN environment, as well as the star formation activity in these galaxies. High-resolution VLBI SKA HI mapping can further trace the distribution of outflowing HI gas, pinpointing its location in the core regions of these galaxies. MOHEGs may also host other spectral lines (such as OH, RRLs, $H_2CO$, $CH_3OH$), offering crucial insights into how feedback, shocks, and mergers regulate star formation, AGN activity, and galaxy evolution. | ["Cosmology","Extragalactic Continuum","Extragalactic Spectral Line","HI Galaxy","VLBI"] | | Mamta | Pommier | mamtapommier@gmail.com | University of Lyon |
| A comprehensive SKA Survey of lensing clusters and lensed galaxies | Lensing galaxy clusters are powerful tools for probing matter distribution, gas interactions, galaxy evolution, and star formation from cosmic noon to the epoch of reionization (z~10) through their gravitational lensing properties. The SKA will transform our understanding of lensing clusters and lensed galaxies, especially at radio wavelengths, where high-redshift ($z > 1$) radio-emitting lensed galaxies are rare. SKA's mid and low-band imaging and spectral line capabilities will enable the mapping of non-thermal ICM emission (haloes, relics, mini-haloes) in merging and cool-core clusters, discovering new populations of lensed galaxies ($0 < z < 6$) through VLBI observations, and studying star formation and atomic gas (HI) outflows in cluster environments. Additionally, spectral line data will help determine the redshift of distant ($5 < z < 10$) gravitationally lensed radio sources via CO, HCN, and HCO+ emissions. This comprehensive approach will deepen our understanding of the interplay between dark matter and baryonic matter, structure formation, gas dynamics, and galaxy evolution in extreme environments across cosmic time. | ["Cosmology","Extragalactic Continuum","Extragalactic Spectral Line","HI Galaxy","VLBI"] | | Mamta | Pommier | mamtapommier@gmail.com | University of Lyon |