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Mapping the Deep Radio Sky in COSMOS with LOFAR

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Observations with LOFAR have explored the northern radio sky, mainly at high declinations. Surveys like LoTSS (Shimwell et al. 2019, 2022) have produced high-quality observations of millions of galaxies at low frequencies. Still, LOFAR observations have been very limited at low declinations (the deep fields NEP, GOODS-N, ELAIS, Lockman, Bootes are all northern fields) since these fields sit at low elevations in the sky. With data from the ongoing DDT19-002 and Cycle 20 (decision pending) for the COSMOS field, we are planning to improve the current sensitivity in COSMOS from RMS ~ 150 μ Jy/beam to ~ 60 μ Jy/beam. Paired with the extensive COSMOS multi-wavelength data set including ongoing JWST imaging (255hrs, Cycle 1) and deep X-ray observations, it will enable state-of-the-art science using sub-arcsec resolution to study high- z populations and environments, star formation processes, gas properties, AGN and galaxy co-evolution, and ICM shocks, to reliably determine the high- z luminosity function of both star bursting galaxies and AGN, and to test the ability of LOFAR to conduct deep imaging at low declinations.