

# ENABLING DETECTION OF THE EPOCH OF REIONIZATION WITH NEXT-GENERATION RADIO INSTRUMENTS

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The epoch of reionization (EoR) is a period in the Universe's history when the first stars and galaxies that formed started radiating high energy photons and ionizing the Intergalactic medium surrounding them until the Universe was completely ionized by  $z \sim 6$ . This period provides important clues on the influence of astrophysical processes in the evolution of large scale structure. Studies of 21 cm redshifted line of HI directly probe this epoch. Numerous experiments to detect the EoR power spectrum are operational such as the Murchison Widefield Array (MWA), Precision Array for Probing the Epoch of Reionization (PAPER) and the Low Frequency Array (LOFAR). However, they are severely limited by the bright foregrounds and unaccounted instrumental systematics. One such important limitation is the systematic spectral structure introduced by electric and geometrical reflections in the instrument which mimics the EoR signal and severely degrades the sensitivity. For the first time, using precise foreground simulations taking wide-field effects into account, we provide a generic framework to set cosmologically motivated antenna performance specifications on these reflections to prevent further EoR signal degradation. The Hydrogen Epoch of Reionization Array (HERA) is designed based on this framework. We demonstrate that the HERA system so designed will enable it to detect the EoR with high significance. I will describe this framework and its applicability to upcoming radio aperture synthesis arrays whose aim is the detection of the EoR.