In this talk, I will analyse the properties of the HI gas in the Auriga project, a set of magnetohydrodynamic cosmological simulations of 30 Milky Way-like objects performed with the moving-mesh code AREPO. After describing the approach used to estimate the neutral hydrogen fraction in the Auriga simulation set, I will discuss morphologies, sizes, masses and profiles of the resulting HI discs. Many of these properties are in reasonable agreement with HI observations of nearby disc galaxies although the simulated HI mass fractions are at the upper end of the observed distributions. Interestingly, there appear to be a correlation between the amount of HI gas outside the mid-plane and the star formation rate in the disc, which is indicative of the presence of a fountain-like flow generating the extra-planar HI component.
Finally, I will analyse the robustness of the findings above with respect to changes in the assumptions adopted for computing the molecular hydrogen fraction and numerical resolution.