

---

# What can we learn from the 21cm power spectrum and 3D images with machine learning?

Yi Mao<sup>\*1</sup>, Hayato Shimabukuro<sup>1</sup>, and Xiaosheng Zhao<sup>1</sup>

<sup>1</sup>Tsinghua University [Beijing] – China

## Abstract

Upcoming SKA1-LOW and HERA will have enough sensitivity to measure the 21-cm power spectrum accurately. We apply the technique of deep learning and show that we can learn some EOR statistics, e.g. bubble size distributions, beyond the 21cm power spectrum from the power spectrum measurement itself. Furthermore, if three-dimensional 21cm images can be made, which contain a wealth of information with regard to how astrophysical sources ionized the intergalactic medium, we demonstrate that the 3D CNN technique can be employed to estimate the parameters of reionization model directly from the 21-cm lightcone 3D images.

---

\*Speaker