

# Disentangling the complex relativistic plasma in the high-redshift merging cluster SPT-CL J2106-5844

## Abstract

SPT-CL J2106-5844 is a very rare, exceptionally massive ( $M_{200} \approx 1e15$  solar mass) cluster observed only  $\approx 5$  Gyr after the Big Bang. As such, it is a critical tracer of how such massive clusters form and evolve. It has recently been revealed to be in a merging state and to host complex, large-scale radio emission which appears to be produced by the brightest cluster galaxy's active galactic nucleus and/or other cluster galaxies, but may also include contributions from a radio halo and/or minihalo. Disentangling the sources of radio emission in this system will provide key clues to understand the formation process of this cluster. However, current radio observations lack the resolution and sensitivity to do so. We propose to observe the cluster with MeerKAT at L-band, making use of its unparalleled angular resolution combined with sensitivity to emission on all scales of interest for the cluster, to understand the relativistic plasma populations, enhance understanding of the merger dynamics, and hence progress our knowledge of the formation process of clusters at this early cosmic epoch.