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Investigating the hot gas in active Brightest Cluster Galaxies

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Abstract content
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We investigate a crucial phase in the cooling-feedback cycle in the unusual star forming Brightest Cluster Galaxies (BCGs) by looking at the optical emission line properties of the reheated gas that ultimately causes the cycle to repeat. We investigate the source(s) of ionisation of the hot, optical line emitting gas in BCGs. No single dominant ionisation mechanism can reproduce the observed emission lines, and it is possible that a mixture of the heating mechanism(s) applies to the nebula(e). To identify the dominant ionisation processes, excitation sources, morphology and kinematics of the hot gas, more line ratios over the entire optical wavelength range is necessary. For this purpose, the spatially-resolved spectra over the entire optical wavelength range for eight nearby, active BCGs in X-ray luminous groups and clusters have been obtained with SALT. The sample was chosen to have Halpha detections, strong indication of star formation activity and existing data from X-ray regime available. The fundamental gas properties such as electron density, gas temperature, metallicity and several abundances were derived using the spectral features in the long wavelength coverage. The present optical sample will be combined with the other multi-wavelength data to form a complete view of the different phases (hot and cold gas and young stars) and how they interact in the processes of star formation and feedback detected in central galaxies in cooling flow systems, as well as the influence of the surrounding intracluster medium (ICM). The preliminary results will be presented, which includes the complexity and spatial variation of the ionisation mechanisms in the nuclei, as well as the large variety of hot gas properties in BCGs.

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Primary author: Dr RATSIMBAZAFY, ANDO (North-West University)

Co-author: Dr LOUBSER, Ilani (North-West University)

Presenter: Dr RATSIMBAZAFY, ANDO (North-West University)

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