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Application of the adiabatic compression scenario to the radio relic in the galaxy cluster A3411-3412

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Radio relics are non-thermal, steep-spectrum ($\alpha < -1$) diffuse radio sources found in the peripheral regions of galaxy clusters. The emission is produced through synchrotron radiation as relativistic electrons ($\gamma \gg 1000$) move in helical paths through the magnetic fields of the intracluster medium (ICM). As the time it would take for the electrons to diffuse over a distance greater than 50 kpc from any compact source is longer than their radiative lifetime of approximately 0.1 Gyr, the electrons have probably been injected or (re)accelerated close to where the emission is observed. Radio relics are widely considered to have originated in intracluster shock waves, since studies have shown that relics seem to trace shock fronts. Although diffusive shock acceleration (DSA) has been widely used to explain the origin of relics, it is inefficient at low Mach numbers and other mechanisms such as adiabatic compression of fossil relativistic electrons are also present in these structures. In this project we apply the adiabatic compression model in an attempt to explain the spatial structure of the spectral index that is observed in the relic hosted in the merging galaxy cluster Abell 3411-3412.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

Primary author: Ms BUTTON, Charissa (University of the Witwatersrand)

Presenter: Ms BUTTON, Charissa (University of the Witwatersrand)

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