

A TREASURE TROVE IN THE MERGING GALAXY CLUSTER ABELL 520

Abstract

The merging galaxy cluster A520 is a collection of rare phenomena that provides a unique laboratory for cluster physics. Its prominent, well-studied X-ray bow shock coincides with an abrupt edge of the giant radio halo. The ratio of post-shock to pre-shock radio brightness provides a test for the origin of the radio halo. MeerKAT has the requisite sensitivity and uv coverage to place a stringent limit on, or detect, the extremely faint pre-shock emission, performing the first definitive measurement of this kind for any cluster shock. MeerKAT will also be able to search for polarization at the edge of the radio halo, providing information on the behavior of the magnetic field after a shock compression. A meandering X-ray trail of the disrupted cool core in A520 is expected to have the magnetic field stretched along the trail; MeerKAT has the angular resolution and sensitivity to look for the resulting polarization in and around the trail. Finally, A520 contains an example of a new, puzzling cluster phenomenon -- a subtle X-ray-dim "channel," possibly a filament of the amplified magnetic field that resulted in depletion of thermal plasma. MeerKAT has the required angular resolution and sensitivity to look for a corresponding radio feature (elevated synchrotron brightness, polarization?) and probe the nature of this phenomenon.