Multi-frequency Radio Study of the Dissociative Merger Cluster CIZA J0107.7+5408

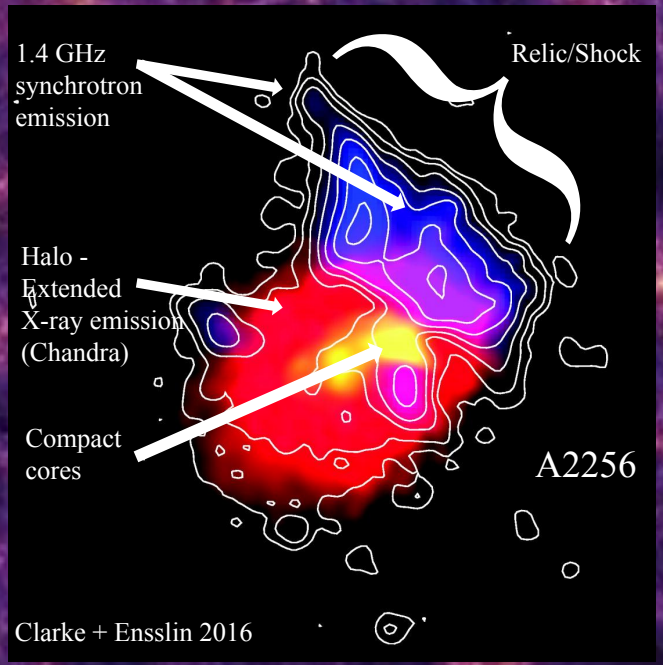
E. Schwartzman[1,2], T. Clarke[2], S. Giacintucci[2], S. Randall[3], R. Van Weeren[4], W. Dawson[5], J. ZuHone[3], A.Zitrin[6], P. Nulsen[3], G. Alvarez[7], A. Stroe[3], E. Blanton[8], E. Bulbul[3], K. Finner[9]

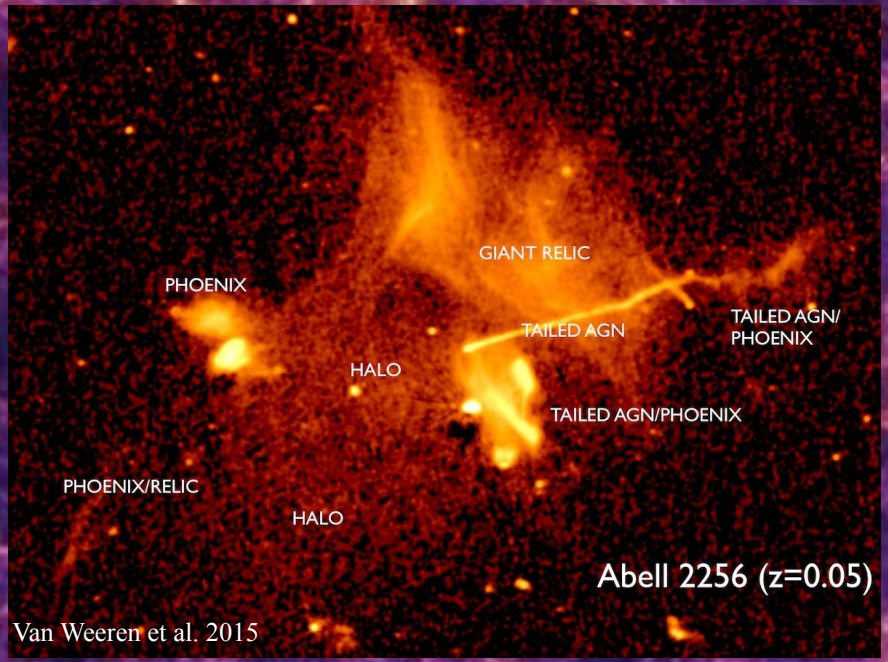
[1]George Mason University, Fairfax, VA, [2]U.S. Naval Research Laboratory, Washington, DC, [3]Harvard-Smithsonian Center for Astrophysics, Boston, MA, [4]Leiden University, Leiden, Netherlands, [5]Lawrence Livermore National Laboratory, Livermore, CA, [6]Ben-Gurion University, Beersheba, Israel, [7]Vanderbilt University, Nashville, TN, [8]Boston University, Boston, MA, [9]Yonsei University, Seoul, Republic of Korea

Galaxy Cluster Mergers

- Largest bound objects in the universe
- Clusters merge at the high density points of the filaments of galaxies

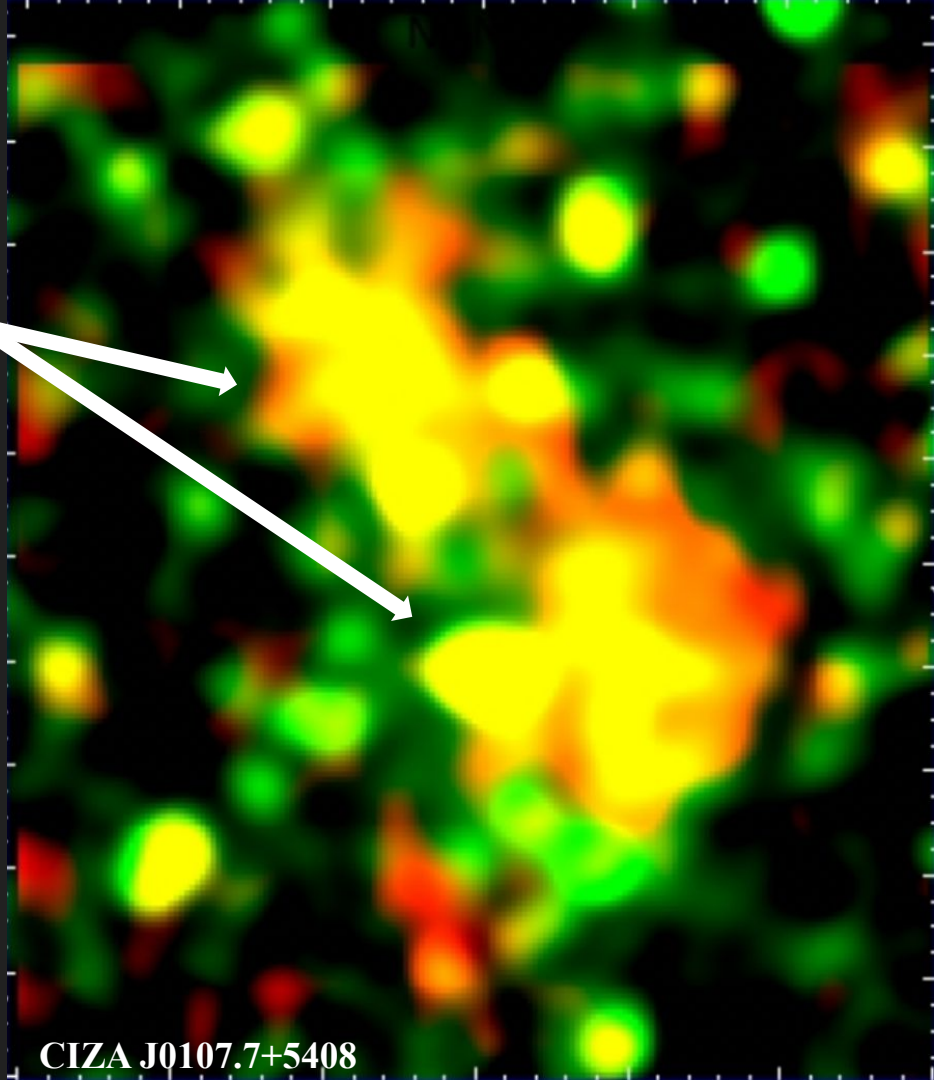
- Highly energetic events that drive shocks, turbulence, and magnetic field compressions
  - All three accelerate/reaccelerate particles
- Possibly home to radio relics, radio halos, shock edges, fossils, etc.

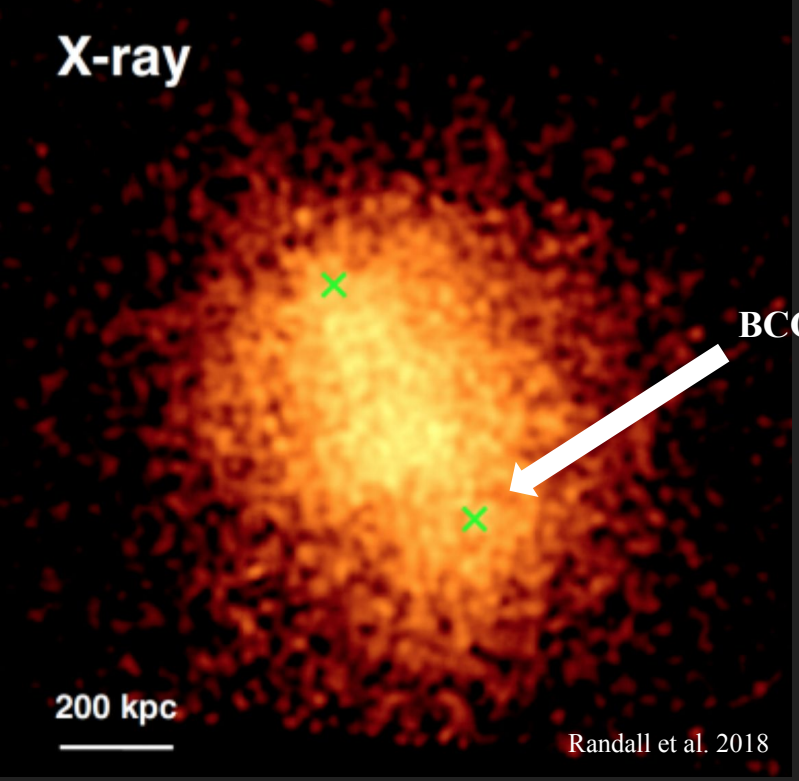




CIZA J0107.7+5408

- Large, post core passage, dissociative, binary merger, with (possibly) two, roughly equal mass subclusters
- Each subcluster has an optical density peak, offset from their associated X-ray density peak (diffuse gas responds to pressure forces, collisionless galaxies do not)
- X-ray morphology shows an elongated, disturbed system, with two identifiable BCGs
- System hosts double-peaked, diffuse radio emission (possibly a double radio relic)

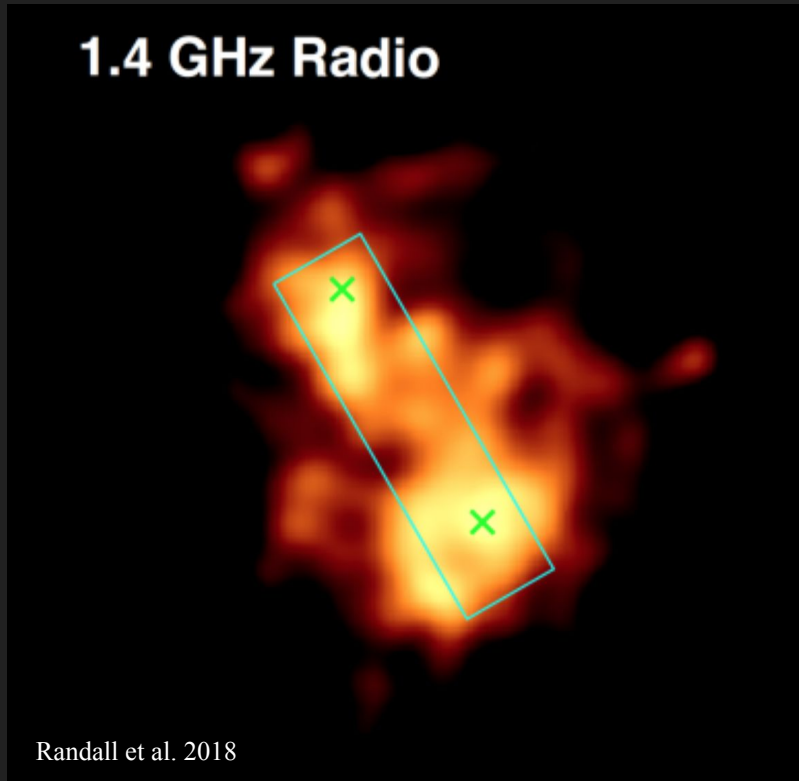




Chandra image, with point sources removed

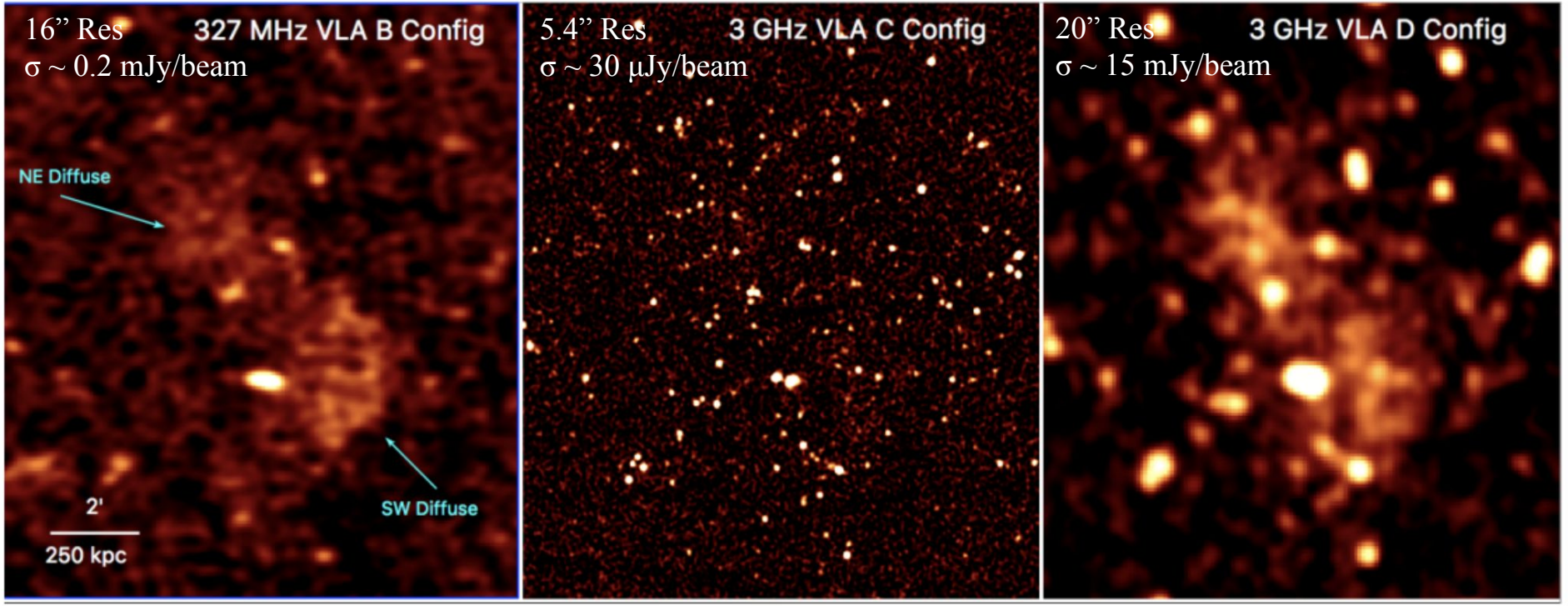
- X-ray morphology shows an elongated, disturbed system, with two identifiable BCGs

1.4 GHz WSRT Radio Image



Multi-wavelength Observations of the Dissociative Merger in the Galaxy Cluster CIZA J0107.7+5408
Randall, et al. 2018.

VLA (Radio) Observations



Spectral index map w/ 74 MHz VLSSr contours (steep spectrum emission)

Emma Schwartzman : AAS 237 Meeting : 13 January 2021

Next Steps

- Deeper, more accurate representations
- Removing point sources for diffuse radio emission analysis
- Polarization studies - halos versus relics
- More detailed Spectral Index Maps - two-component resolution
- High resolution, A configuration, P band data - ultrasteep spectrum
- Newer X-ray data (Randall, et al.)