Studying the Effect of Shock Obliquity on the γ-ray and diffuse Radio Emission in Galaxy Clusters

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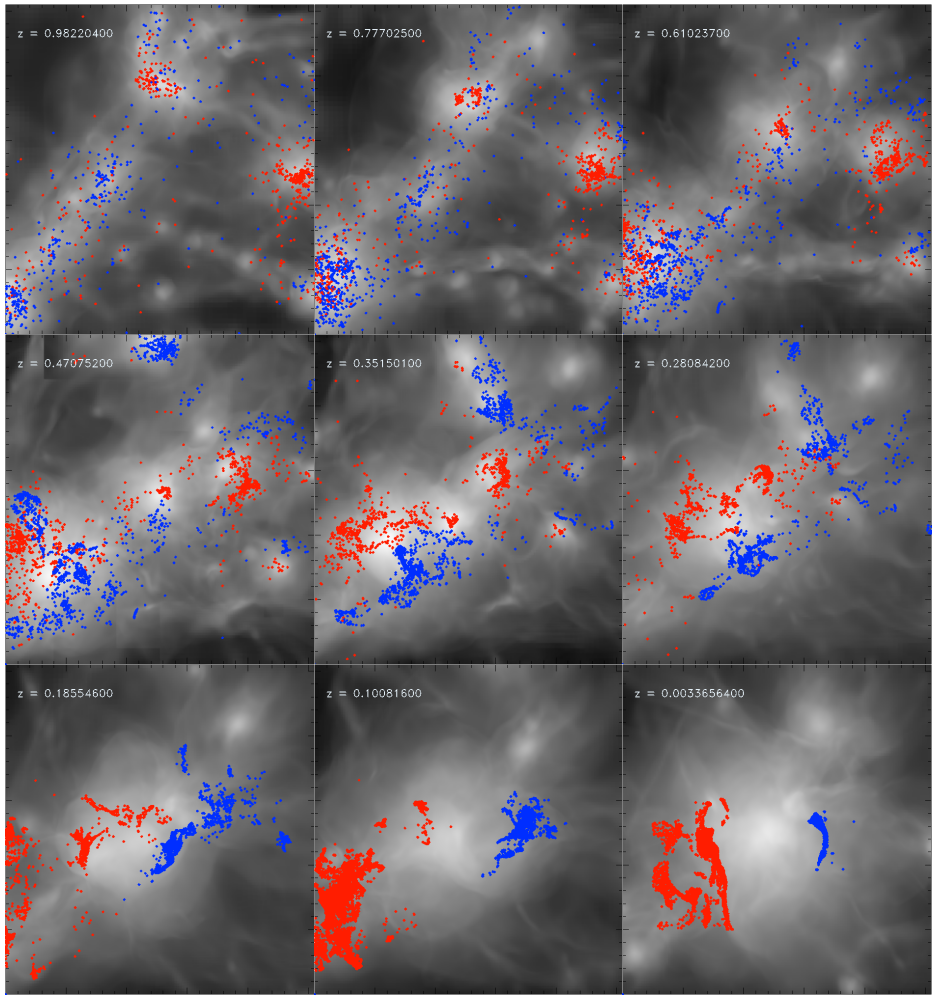
How does the shock obliquity affect the shock acceleration of cosmic-ray electrons and protons?

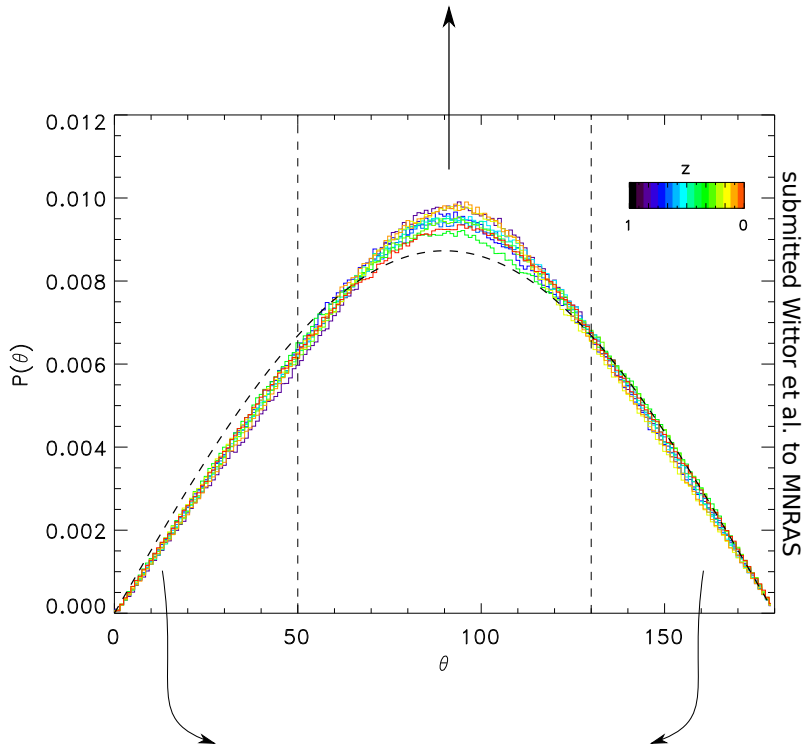
CRaTer: A Lagrangian Tracer Code



submitted Wittor et al. to MNRAS

perpendicular: acceleration of electrons by shock-drift acceleration

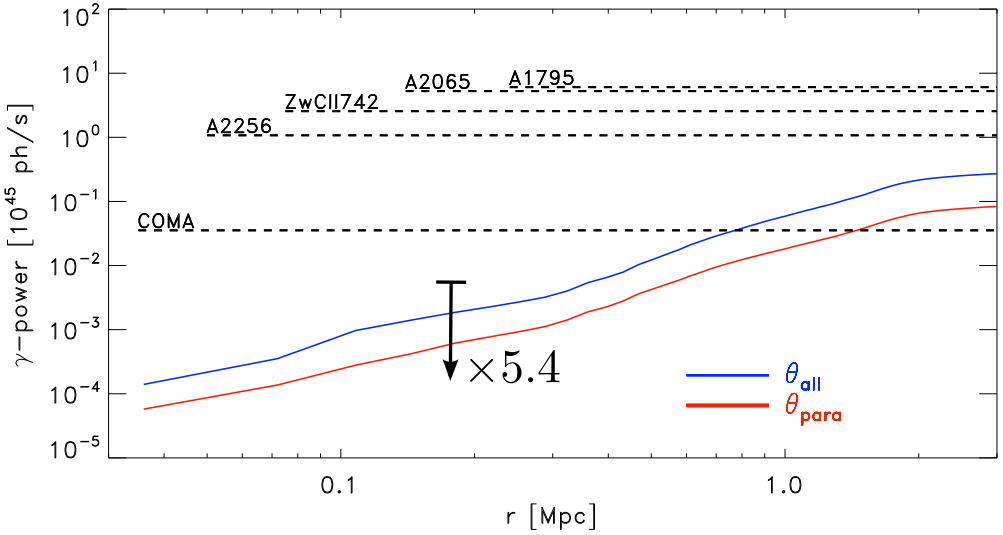
(Guo et al. 2014)



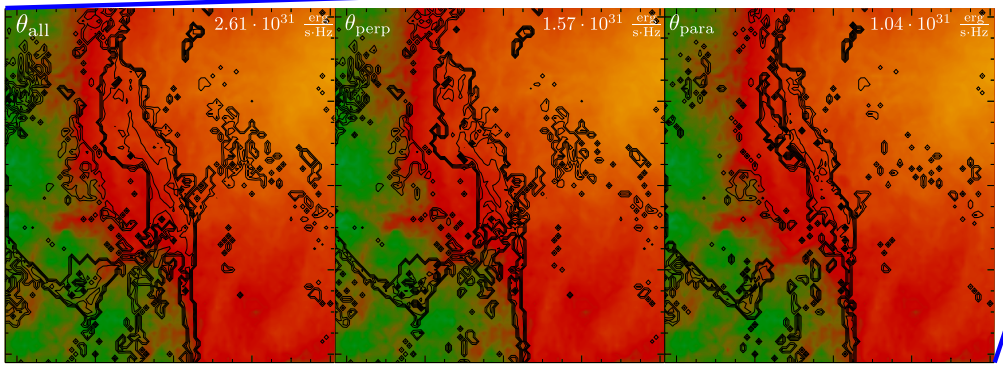
parallel: acceleration of protons by diffusive shock acceleration

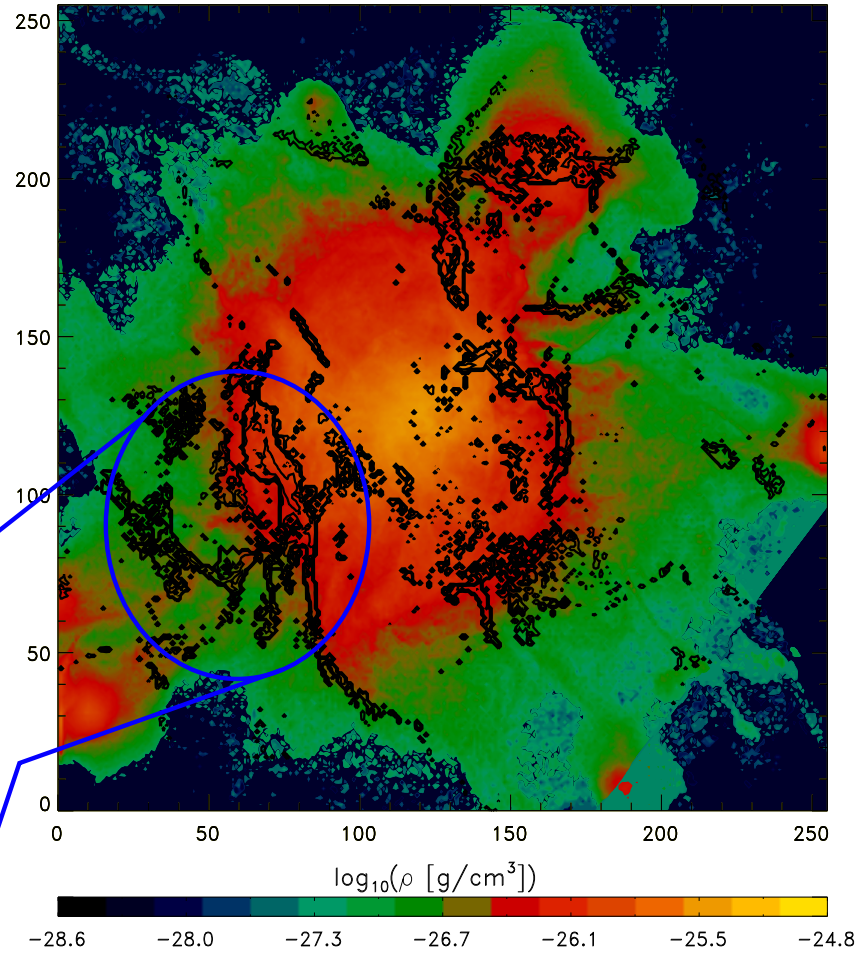
(Caprioli et al. 2014)

γ – ray profile



density map & radio contours





- γ-emission reduced by ~ 5.4 if only parallel shocks accelerate p^+
- Radio emission reduced by $\sim 40\%$ if only perpendicular shocks accelerate e^+
- see Wittor et al. submitted to MNRAS for all results and more