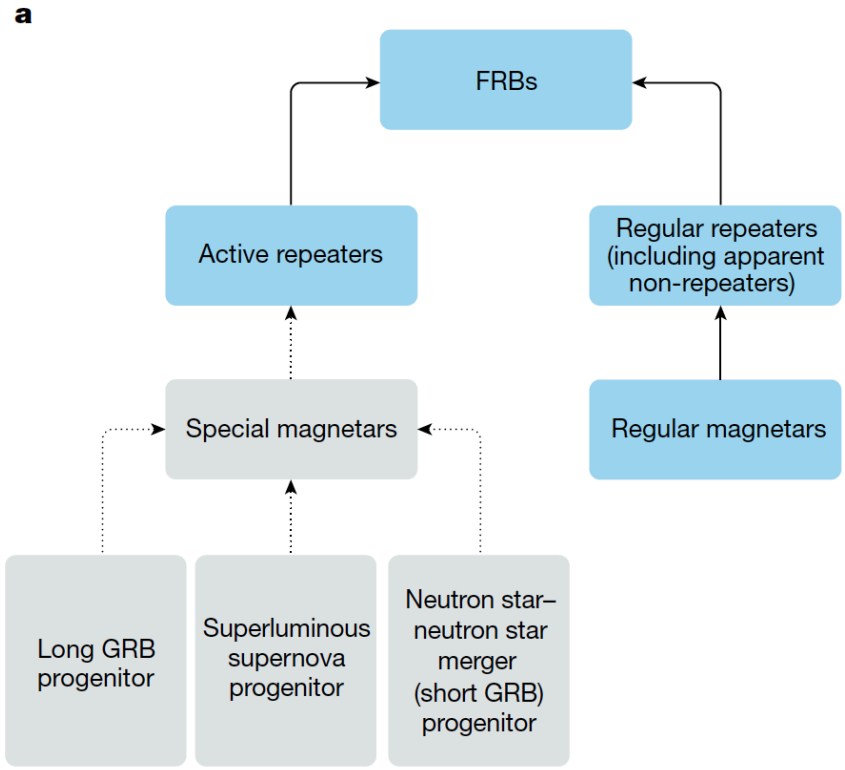
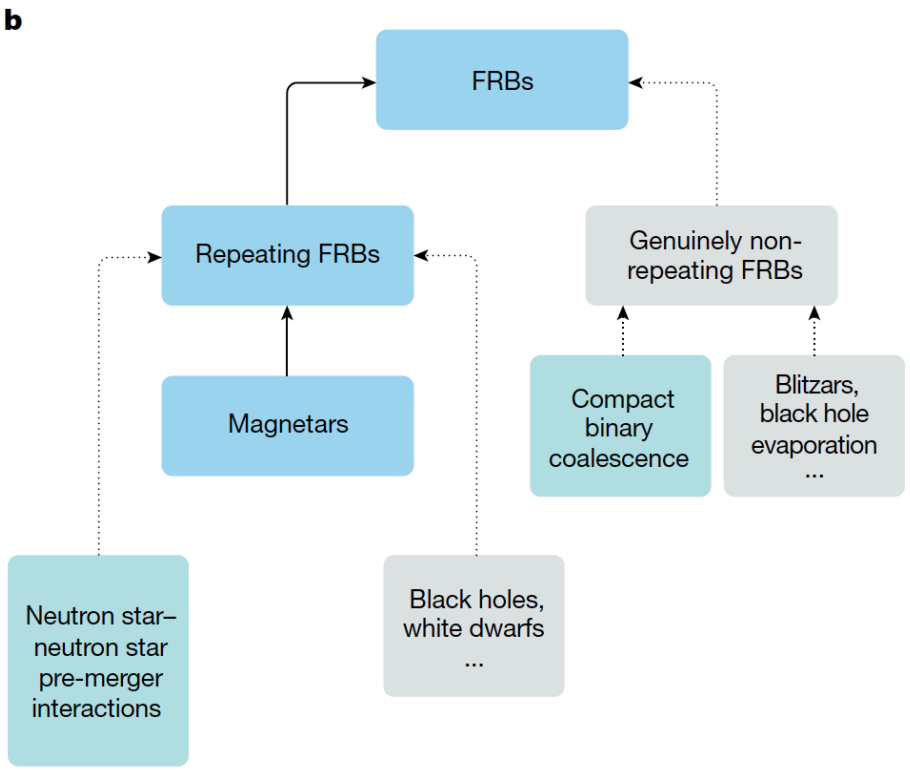
Conservative and speculative views of FRBs

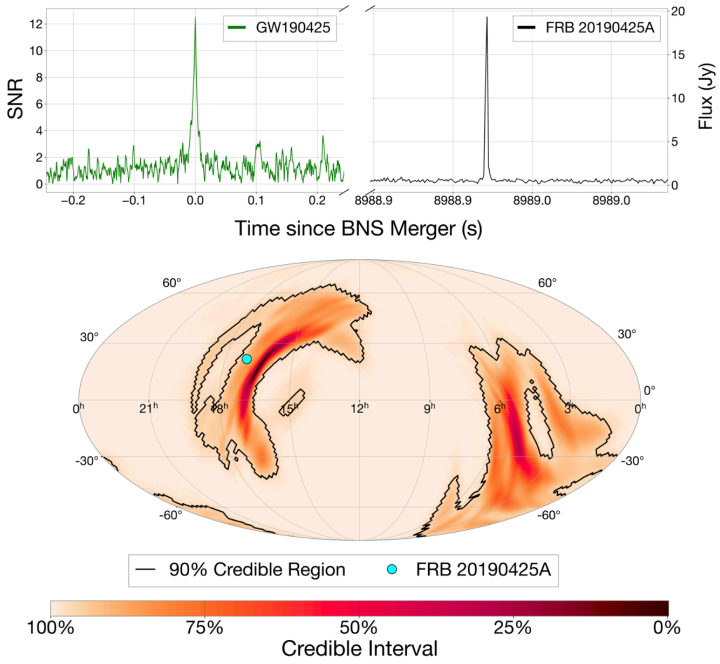


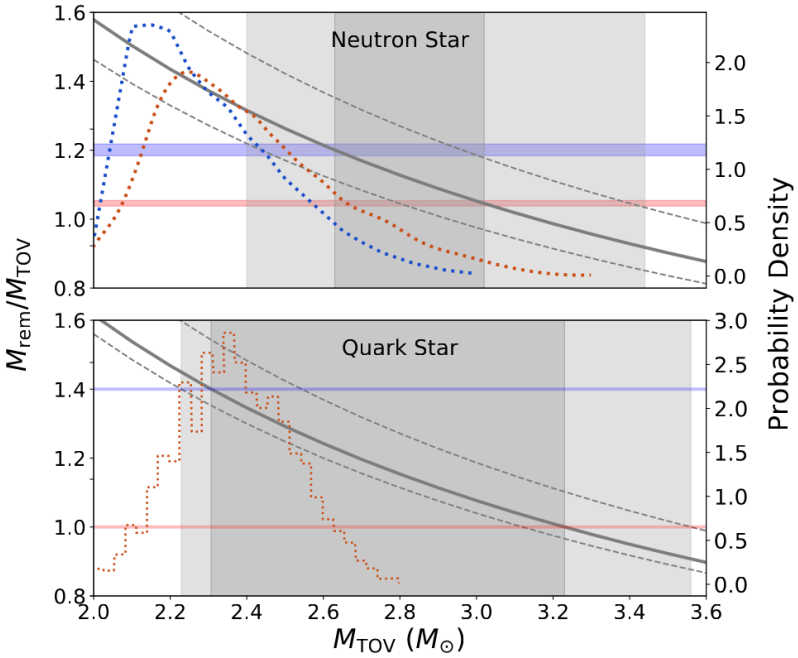


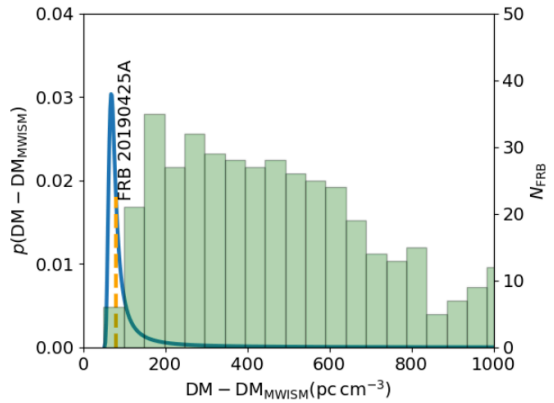
BZ, 2020, Nature, 587, 45

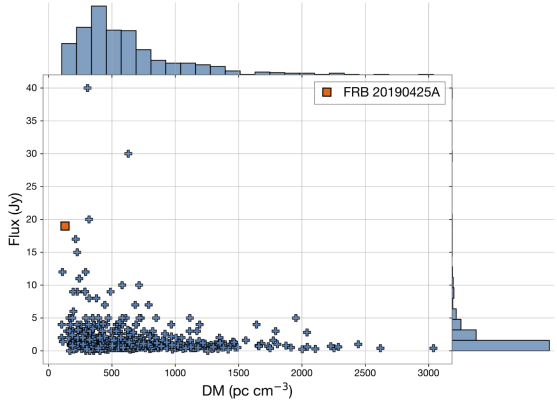
GW190425 & FRB 20190425A: an association?

Moroianu et al. (2022), under review









Random chance:
1.9×10^{-4}

Questions

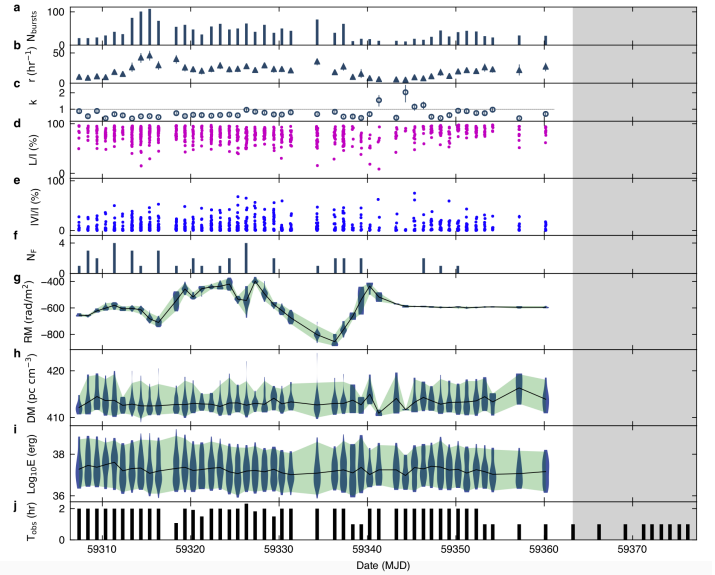
- Are the current data still consistent with the "Magnetars make them all" hypothesis?
  - What magnetars are making active repeaters?
  - What magnetars are making apparent non-repeaters?
  - What magnetars are making M81 GC-like repeaters?
  - Can these different magnetar populations be understood within a unified magnetar formation framework and be consistent with the magnetars we observe and hypothesize?

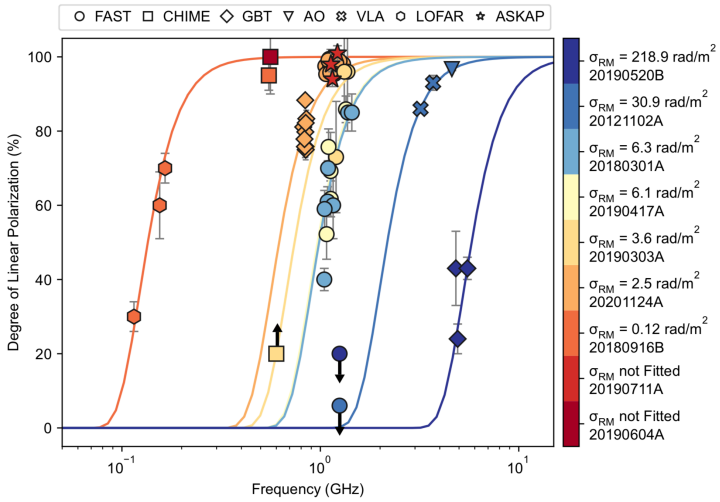
  How to understand the following observations?
  - The majority of FRB host galaxies and the FRB locations in the galaxies (including active repeaters) are not actively star forming
  - Dynamically evolving magnetized environment
  - CHIME FRB DM distribution

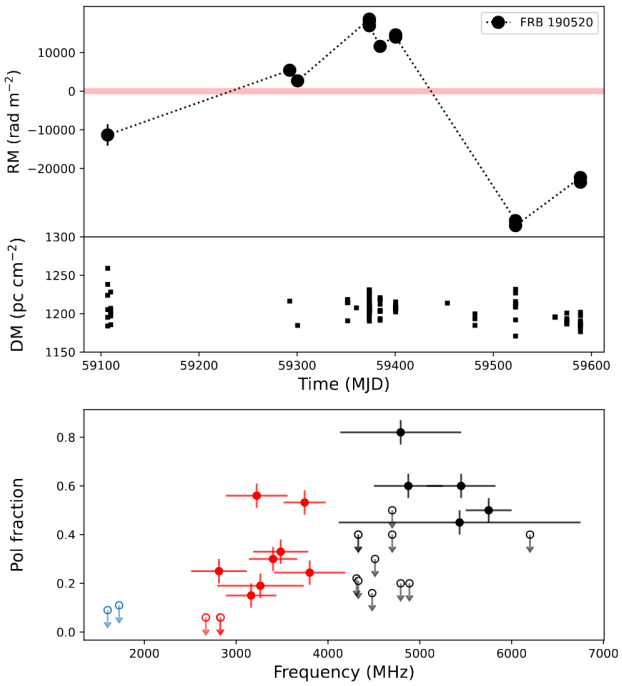
- Are there genuinely non-repeating FRBs?
  - What mechanism can make so many?
  - Only a small fraction of apparently non-repeating FRBs are genuine?

Complicated environments

Y. Feng et al. 2022; Science; H. Xu et al. 2022, Nature;
Anna-Thomas et al. 2022; Dai et al. 2022

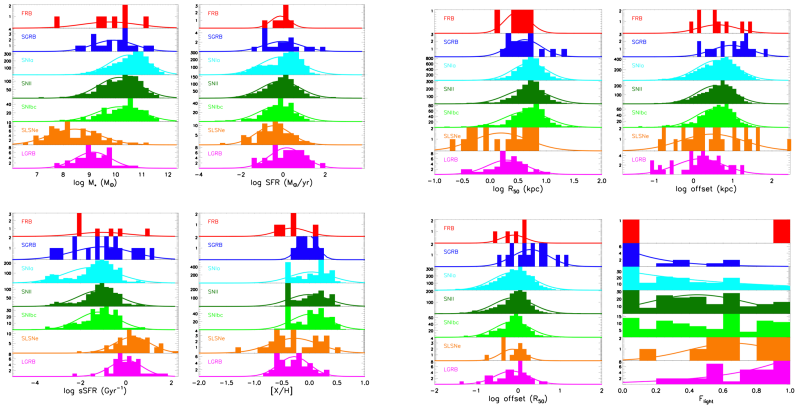


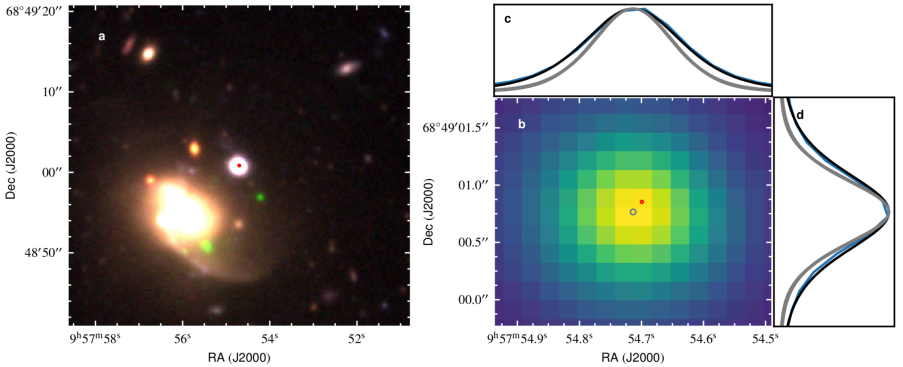


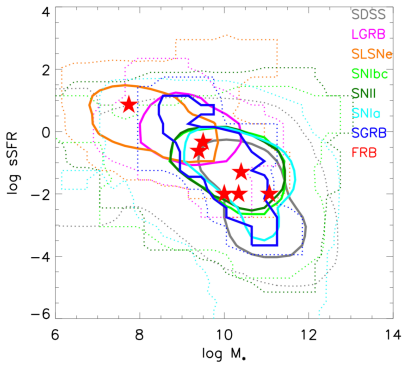


Dynamically evolving, magnetized environment

FRB host galaxies & locations

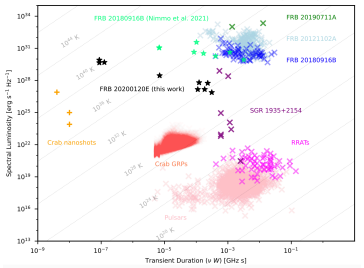




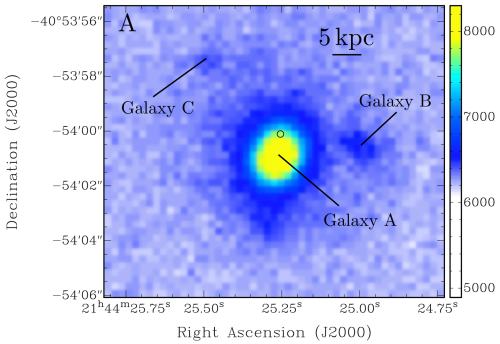


Host galaxy properties & FRB locations consistent with old population:

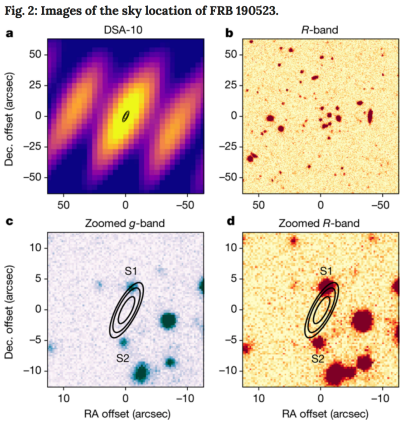
Li & Zhang, 2020, ApJL, 924, L14



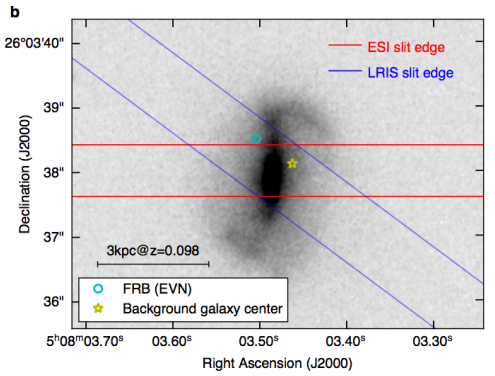
FRB 20200120E; M81 globular cluster
Kirsten et al. 2022; Nimmo et al. 2022



Bannister et al. 2019

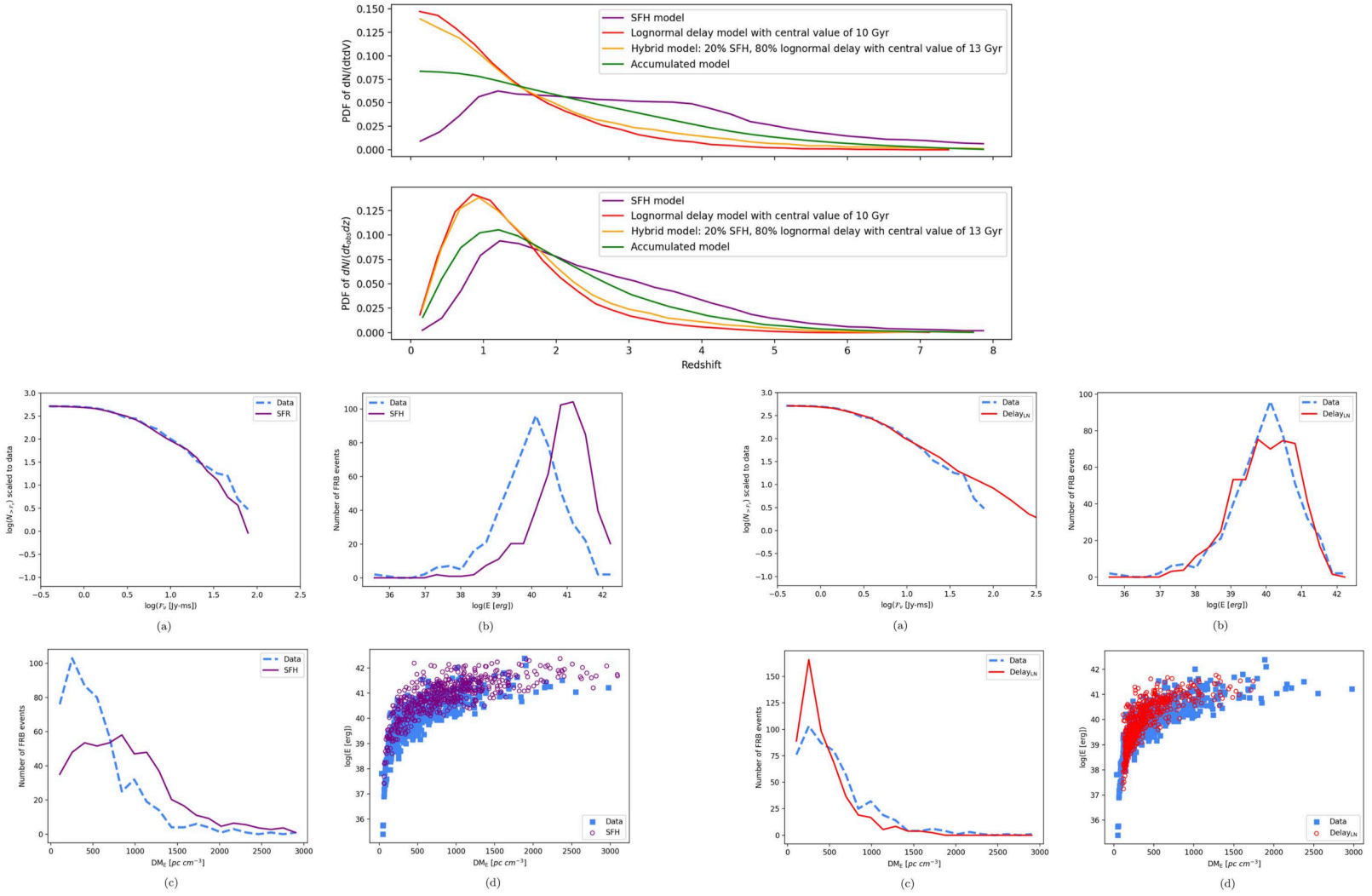


Ravi et al. 2019



FRB 20201124A, Xu et al. 2022

CHIME FRBs track star formation?



R. C. Zhang & B. Zhang, 2022, ApJL, 924, L14
see also Qiang et al. 2021; Hashimoto et al. 2022