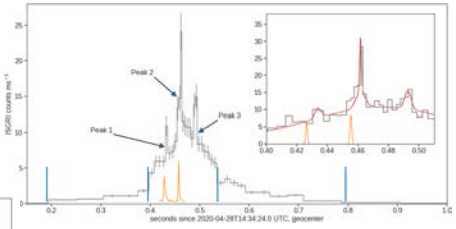
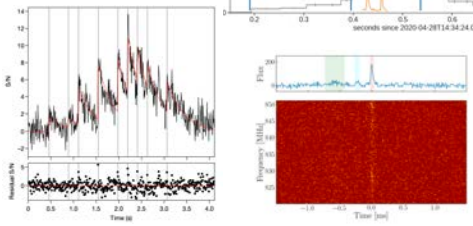
Whence to FRB - Maxim Lyutikov (Purdue)

1. FRBs are magnetospheric

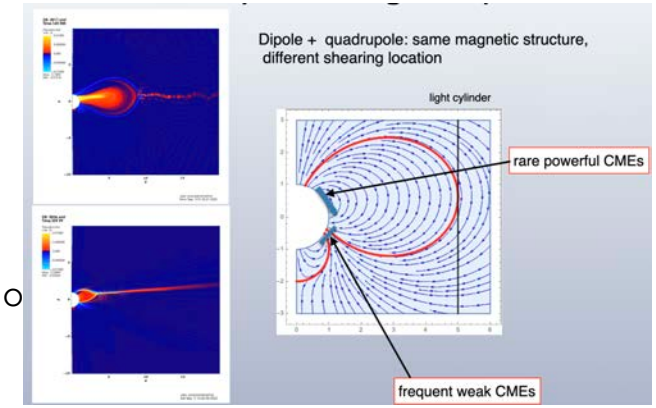
- Temporal coincidence X-ray-radio
- magnetar association
- Radio leads X-ray
- frequency drifts
- PA swings
- periodicity
- micro-nano structure





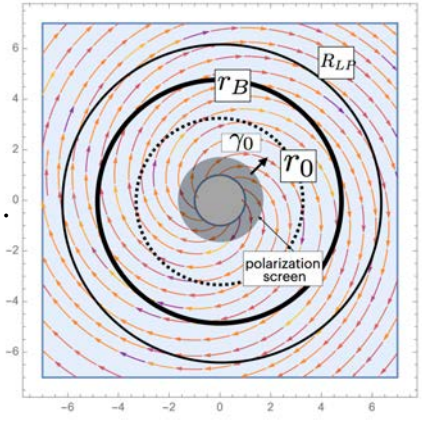
2 Where to shear the footpoints

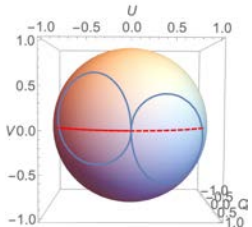
- Solar flares paradigm.
- What matters are:
  - size of active region
  - value of B-field
  - Hall shearing rate ~ B^2
  - **location of shear**
    - do field lines extend far o
    - or close near the star?

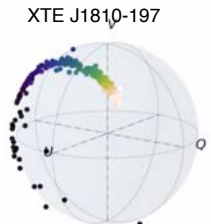


3 Polarization: Faraday conversion in the inner wind

- Pair plasma screen of DM= 10^{-6} pc cm^{-3} can give large Pi-transformation!
- Can produce
  - Large Circular
  - Large RM, with changing signs
- non-standard $RM \propto \lambda^{\alpha}, \alpha \neq 2$
- RVM+ Π-conversion: tracks on Poincare sph.

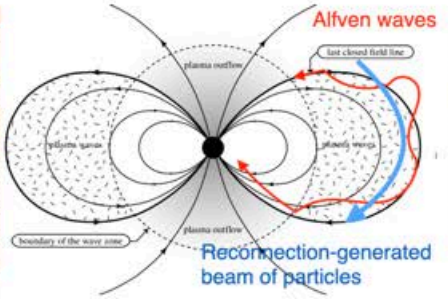


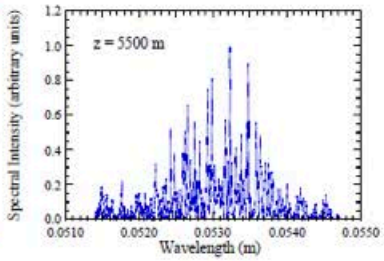




4. Emission mechanism: Free Electron Laser

- Guide-field dominated regime
- Alfven waves in the magnetosphere (wiggler)
- **Reconnection-driven** beam of charged particles
- bunches induced by wiggler emit collectively
- E.g. narrow line with pulse sub-structure





5. Maxim Lyutikov (Purdue U.)

- M.S. magna cum laude, Theoretical Physics, 1992, *Moscow Engineering Physics Institute*, Moscow
- Ph.D., Theoretical Astrophysics, 1998 , *California Institute of Technology*, Pasadena, CA
- Professor, Purdue Department of Physics and Astronomy (assistant, associate, full, 2006 -)

- Research topics: Plasma astrophysics, compact objects

- Synergistic Activities: *Plasma 2020*, panel member