

Proposal Abstract:

The pulsar B1957+20 and its companion are the center of several important astronomical mysteries. Several of these mysteries relate to the apparent eclipse of the pulsar by its companion. Firstly, measurements of the length of the period of enhanced Dispersion Measure (DM) suggests that the extra material around the companion extends several times further than its expected Roche lobe. Additionally the total excess DM just before the pulsed emission is entirely lost in the eclipse suggests an electron column density too low to explain the eclipse through regular absorption. Both problems could be solved by the introduction of magnetic field in the companion wind with a strength near 20G at the interface of the pulsar and companion winds. Previous attempts to measure the magnetic field using Faraday delay and rotation have suffered from the need to average many regular pulses, resulting in an averaging down of the magnetic field over any small scale structures, or a lack of suitably polarized giant pulses in the eclipsing region. Since suitable giant pulses are expected to occur once or twice per eclipse, follow up observations with the signal to noise ratio of FAST are expected to be able to measure the field.