

Call for MS/PhD students

Pulsar astrophysics at BGU

Pulsars - rapidly rotating neutron stars that send out enigmatic pulsed signals - have puzzled astronomers for 40 years. It is generally believed that the pulsar activity is associated with generation of relativistic electron-positron plasma. The plasma is generated because a very strong electric field is excited around the rotating, magnetized neutron star so that particles are accelerated to very high energies until the electron-positron cascade develops and the newly formed plasma shorts out the accelerating electric field. A theoretical understanding of pulsars would have to include an understanding of how the electron-positron plasma is produced and ejected from the neutron star, how the observed emission is generated within the relativistic plasma flows and how the rotational energy of the neutron star is eventually transferred to the plasma. The astrophysics community has devoted considerable effort to researching these problems with much success, but much remains to be understood.

Theoretical study of pulsars at BGU is now funded by Israeli science foundation under the grant ISF 737/07 "Plasma electrodynamics in pulsar magnetospheres". Students are welcome to take part in this research.

The objective of the research is to understand physics of the plasma production and to find basic characteristics of the plasma flows in the pulsar magnetosphere. Specifically the research plan includes:

1. Particle-in-cell simulations of the electron-positron plasma production in rotating, magnetized neutron stars
2. Calculation of the X- and γ -ray emissions accompanying the plasma production process, comparison of the results with the available data and making observational predictions for the upcoming missions, first of all for the orbital γ -observatory GLAST

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