

ASTROPHYSICS AND PARTICLE PHYSICS

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Burst astrophysics and macro object shell model

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Hypersphere World–Universe Model (WUM) gives an explanation for Gamma-Ray Pulsars (GRPs), Gamma-Ray Bursts (GRBs) and Fast Radio Bursts (FRBs) through the frames of Macroobject Shell Model. According to WUM, Macroobjects (MO) possess the following properties: Nuclei are made up of Dark Matter particles (DMP). Surrounding shells contain dark matter and baryonic matter; nuclei and shells are growing in time proportionally to root square of cosmological time until they reach the critical point of their stability, at which they detonate; the energy released during detonation is produced by the annihilation of DMP; the detonation process does not destroy MO; it's rather Hyper-flares analogous to Solar flares; all other DMP can start annihilation process as the result of the first shell instability and give rise to a gamma-radiation with different emission lines in spectra of GRBs. Consequently, the diversity of very high energy bursts has a clear explanation; afterglow is a result of processes developing in nuclei and shells after detonation. The described picture is consistent with experimental results for GRBs. According to WUM, GRPs are rotating neutralino stars and WIMP stars that have maximum mass and minimum size which are equal to parameters of neutron stars. WUM predicts that the concentration of protons and electrons in intergalactic plasma n decreases inversely proportional to cosmological time and in present epoch equals to $n = 0.25 \pm 0.01 \text{ m}^{-3}$. The energy density of Intergalactic Plasma relative to the critical energy density equals to $\Omega_p \approx 0.048$. Time delay of FRBs is calculated through these characteristics. The calculated values are in good agreement with experimentally found values. Many experimental results, including the redshift for FRB 150418, remarkable brightness for FRB 150807 and transient gamma-ray counterpart for FRB 131104 are explained. WUM can serve as a basis for Transient Astrophysics.

Biography

Vladimir S Netchitailo is Doctor of Sciences in Physics, having worked under the guidance of Alexander Prokhorov, a Nobel Prize winner. During his career, he has published over 150 papers. He has developed the World-Universe Model - a cosmological model that demonstrates that there exist direct relationships among the cosmological parameters of the world and provides a mathematical framework that allows calculating them directly.

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