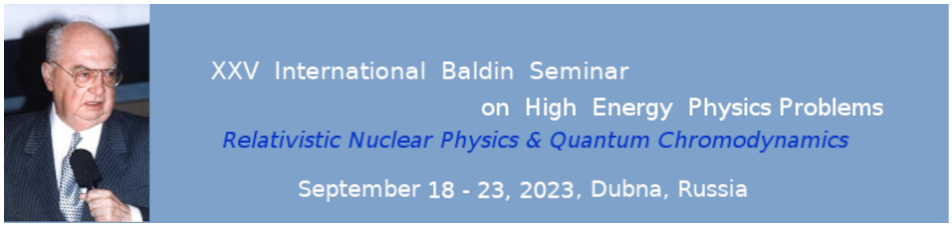

Contribution ID: **157** Type: **not specified**

Quantum tunneling in stars

Fusion in stars creates chemical elements.
Proton-proton cycle as one of the main of nuclear fusion reaction in the Sun converts hydrogen to helium.
Due to temperature and density of a star this reaction has different probabilities to occur.
The core of a Sun has a density of up to 150 g/cm3 and a temperature is close to 15.7 million Kelvin (K). By contrast, the Sun's surface temperature is approximately 5800 K.
Schroedinger equation is used as the main explanation that this reaction happens.
\begin{align} i\hbar\frac{\partial \Psi}{\partial t} = -\frac{\hbar^2}{2m}\frac{\partial^2 \Psi}{\partial x^2} + (V-E)\Psi(t,x),
\end{align}
where $\hbar$—Planck's constant,
m— mass of our particle, and V—potential term specific to each example of particle motion.
Usually, stationary version of equation is used.
Different potentials will be demonstrated with a range of temperatures and densities.
For comparison Gamov Peak concept is considered aswell.
References:
An Introduction To Quantum Mechanics, D.J. Griffiths (1995), Second edition, Pearson Education ltd., 2005

Primary author: Mr FIONOV, Andrey (Russian Quantum Center)

Presenter: Mr FIONOV, Andrey (Russian Quantum Center)

Session Classification: Parallel: Nuclear astrophysics