TECHNISCHE UNIVERSITÄT DRESDEN

School of Science Faculty of Physics

PHYSICS COLLOQUIUM

Speaker:

Prof. Bert Tobias Fischer
University of Wroclaw (Poland)

Topic:

The difficult relationship between the nucleosynthesis of heavy elements and core-collapse supernovae

Time and place:

Tuesday, November 1, 2022, 4:40 pm – hybrid event
The colloquium will be held in in REC/C213.
Online participation possible:
Zoom-Meeting: Meeting-ID: 631 3817 8900 / passcode: PK-WiSe22
https://tu-dresden.zoom.us/j/63138178900?pwd=RVVZM3N4azdmNmVJQ2RWUTZ0TkhXdz09

Host: Prof. Kai Zuber

Abstract:

From stellar spectroscopy it is known that the elements are abundant at its whole variety, known from the periodic table, not only at the surface of our sun but also at distant stars. Of particular interest are stars enriched with heavy elements, for example strontium, barium and europium as well as even trans actinides such as plutonium, and at the same time poor in iron. In this context, iron is used as a measure of the age of the star since the amount of iron increases continuously from one stellar generation to the next, given that the very first generation of stars had zero metal content. While the nuclear physics process for the synthesis of heavy elements is rather well understood, known as the neutron capture process, in order to understand the observed stellar abundances of heavy elements as well as their galactic chemical evolution, explosions of massive stars have long been considered as the classical astrophysical site. However, recently, there seems some twist in this standard explosive nucleosynthesis picture. In order to provide a comprehensive view on the possible solutions of the associated supernova problem, i.e., the physical mechanism which drives massive star explosions, large-scale computer models are being developed, within the framework of general relativistic neutrino radiation hydrodynamics. In my talk I will revisit recent developments, in particular on the astrophysical modelling side with improved input physics. To a fair extent, this concerns the yet incompletely understood state of matter at extreme condition, encountered at the interior of supernova explosions, for which at present even the world's largest particle and nuclear physics accelerator experiments cannot provide conclusive insights.

Bio: 2005 – 2009: Ph.D. in Physics, University of Basel (Switzerland) / 2010 – 2013: post doc, GSI Helmholtz Zentrum für Schwerionenforschung / GmbH, Darmstadt (Germany) / 2013 – 2018: Assistant Prof., University of Wroclaw (Poland) / Since 2018: Associate Prof., University of Wroclaw (Poland).