

FAKULTÄT für PHYSIK  
LUDWIG-MAXIMILIANS-UNIVERSITÄT  
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT  
TECHNISCHE UNIVERSITÄT MÜNCHEN  
MÜNCHEN/GARCHING

## Garching Maier-Leibnitz-Kolloquium

Donnerstag, 03.11.2022, 16<sup>15</sup> Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1  
Treffen zum gemeinsamen Kaffee 16 Uhr

Dr. Motoko Fujiwara

(Physik Department T30d, Technische Universität München)

### Capture of Dark Matter in Neutron Stars

Dark matter (DM) capture in neutron stars will provide a new laboratory by using these extreme environments. DM is an unknown massive gravitational source in our universe that occupies about 85% of the matter-energy density. Currently, we have various DM searches such as direct detection experiments, which are underground experiments to probe DM elastic scattering through the nucleon recoil events. Besides these approach, neutron stars will be efficient targets for DM search: If DM accretes into stars, the surface temperature of an old isolated neutron star is heated up to about 2400 K, which is anomalously hot compared with standard predictions. This temperature, corresponding to the infrared, may be probed by the James Webb Space Telescope, and we may constrain DM features such as DM-nucleon scattering cross sections. The greatest advantage of this DM capture is that it is a relativistic process, which are not possible in ground-based experiments. Due to the strong gravitational potential, DM is accelerated to reach about 50% of the speed of light near the surface of neutron stars. This feature is crucial to probe inelastic processes since momentum transfers will range up to 100 MeV. Focusing on this significant merit, I will demonstrate the complementarity between neutron star observations and direct detection experiments in the framework of electroweak-charged DM. I will also address a possible background signal for this search strategy, such as neutron star internal heating.

*Hybrid online access via ZOOM:*

<https://lmu-munich.zoom.us/j/98457332925?pwd=TWc3V1JkSHpyOTBPQVlMelhuNnZ1dz09>

Meeting ID: 984 5733 2925

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