



Canadian Association  
of Physicists

Association canadienne  
des physiciens et physiciennes

Contribution ID: 3334 Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

## **(G\*) The S-wave pairing gap in neutron matter**

*Monday, 6 June 2022 16:00 (15 minutes)*

The existence of S-wave neutron superfluidity in the inner crust of neutron stars is well established and it affects the thermal properties and the cooling of the stars. In this talk, I will present a detailed ab initio study of the S-wave pairing gap and the equation of state of superfluid neutron matter. These calculations were carried out using the auxiliary field diffusion Monte Carlo method for finite systems and the results were extrapolated to the thermodynamic limit. I will also discuss how we quantify the error of this extrapolation using phenomenology, such as the symmetry-restored BCS theory of superconductivity. These results can be used in calculations of thermal properties of neutron stars and they can be probed in cold atom experiments utilizing the universality of the unitary Fermi gas.

**Primary author:** PALKANOGLU, Georgios

**Co-authors:** GANDOLFI, Stefano (Los Alamos National Laboratory); GEZERLIS, Alex (University of Guelph); Dr CARLSON, Joe (Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545, USA); Dr SCHMIDT, Kevin E. (Department of Physics, Arizona State University, Tempe, AZ 85287, USA)

**Presenter:** PALKANOGLU, Georgios

**Session Classification:** M3-1 Advances in Nuclear and Particle Theory (DTP/DNP/PPD) | Progrès en théorie des particules et des noyaux (DPT/DPN/PPD)

**Track Classification:** Technical Sessions / Sessions techniques: Theoretical Physics / Physique théorique (DTP-DPT)