

Probing cosmic superfluids

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Neutron stars are the exotic remnants left over after the supernova explosions in which massive stars end their lives. They are associated with a range of phenomena observed in radio, X-rays, gamma-rays and hopefully soon gravitational waves as well. Because of the extreme densities of these stars, where more than the mass of our Sun is compressed inside a 10 kilometer radius, they represent exotic physics that cannot be tested in the laboratory. The state of matter in these systems is hotly debated, but it is generally accepted that they are cold enough to contain superfluid components. There is strong observational support for this idea, but we are still far away from having truly quantitative models. In this talk I will describe the nature of the problem, summarize the key physics and outline the computational modelling required to make progress.