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Strangeness in Neutron Stars

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Neutron stars contain cold hadronic matter gravitationally compressed to densities that may be ten to twenty times higher than the density of ordinary nuclear matter. At such extreme conditions, pressures in the cores of neutron stars might be able to break neutrons, protons, and other hadronic constituents in the centers of neutron stars into their quark constituents, creating a new state of matter known as quark matter. If quark matter exists in the cores of neutron stars, it will be a color superconductor whose complex condensation pattern changes with density inside the star. The strange quark plays a crucial role in all of this. It is also a key player for the possible existence of absolutely stable strange quark matter, a configuration of matter even more stable than nuclear matter. In the latter event, neutron stars would be largely composed of superconducting strange quark matter, possibly enveloped in a thin nuclear crust. In this talk I will review the exciting role played by the presence of strangeness in cold hadronic matter at high densities, followed by a discussion of the astrophysical implications of strangeness in neutron stars.