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Experimental tests of general relativity in binary systems

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The radio sky is a fascinating laboratory for a very wide range of physics. The laws of nature can be probed at a fundamental level, in particular when observing the most extreme matter in the observable universe - neutron stars. When they are visible as radio pulsars they can act as cosmic clocks that become especially interesting if they have a binary companion. Indeed, binary pulsars provide indispensable laboratories for precision tests of gravity. Effects that can be studied in great detail include the emission of gravitational waves, Shapiro delay, orbital precession and more. But also fundamental differences between general relativity and alternative theories of gravity can be probed, such as possible violations of the strong equivalence principle, preferred frame effects or the existence of gravitational dipole radiation or scalar fields. Also the effects of spin precession in strongly self-gravitating bodies can be studied by observing effects of geodetic precession. These and other tests, and the comparison with other methods, will be discussed.

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