Evolution of magnetic fields of neutron stars

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Estimations of magnetic fields of neutron stars, observed as radio and X-ray pulsars, are discussed. Radiopulsars in close binaries and millisecond pulsars, which have passed the stage of disk accretion (recycled radiopulsars), have magnetic fields 2-4 orders of magnitude smaller than ordinary single pulsars. Most probably, the magnetic field of the neutron star was screened by the infalling material. Several screening models are considered. Properties of pulsars in the unique double-pulsar binary give evidence in favor of this model. Theoretical and observational values for different types of radiopulsars are in good correspondence with theoretical estimations. The formation of single recycled pulsars by loosing their binary companions is discussed.

Magnetic fields of some X-ray pulsars are estimated from the cyclotron line energy. In the case of Her X-1 this estimation exceeds considerably the value of the magnetic field obtained from long term observational data related to the beam structure evolution. Another interpretation of the cyclotron feature, based on the relativistic dipole radiation mechanism, could remove this discrepancy. Observational data on soft gamma repeaters and their interpretation as magnetars are critically analyzed.