

# Neutron star magnetic fields: attempt at a complete scenario

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Neutron stars have the strongest magnetic fields known anywhere in the Universe. Nevertheless, their total magnetic flux has a similar distribution as in two other classes of stars that also have persistent magnetic fields: upper main sequence stars and white dwarfs. Probabaly, all these stars have stable magnetic configurations in their interiors, possibly such as have recently found in simulations by Braithwaite and collaborators. The similar fluxes also suggest some evolutionary relation (through flux freezing during gravitational contraction) between upper main sequence stars and their compact descendants. However, this connection is not likely to be simple, as neutron stars go through an initial phase of strong activity in which the field is almost certainly modified. At the end of this phase (less than a day), a stable field may be established, which can however evolve over thousands or millions of years by various dissipative processes, possibly generating the rich phenomenology in the so-called “magnetars, magnetically powered neutron stars, that includes soft gamma repeaters and anomalous X-ray pulsars. In this talk, I intend to give an overview of the observational phenomenology and the physical processes involved in the evolution of neutron star magnetic fields.