

Magnetic field amplification during core collapse

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Magnetic fields, if sufficiently strong, may affect the dynamics of core collapse. Though most likely present in all progenitor stars as well as the neutron stars produced in core collapse, they are only expected to play an important role in a subclass of event in which the rather weak pre-collapse field strength can be amplified by a large factor and on time scales comparable to those of the dynamics of collapse and explosion. Such an amplification can be provided by several different mechanisms. The mechanisms can be broadly classified in those that require rapid rotation and those that can operate even in non-rotating stars. The latter group contains amplification by compression and hydrodynamic instabilities excited in the proto-neutron star and the surrounding layers, while the former group contains the winding of poloidal field into toroidal and the magneto-rotational instability. I will discuss these processes, the conditions under which they occur, and likely consequences for the dynamics.

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