

INTRODUCTION TO THE SESSION “COMPACT OBJECTS AND STRONG AND ELECTROWEAK INTERACTION”

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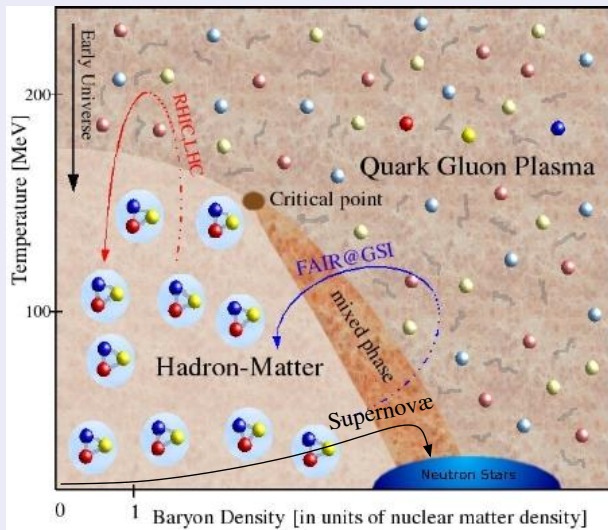
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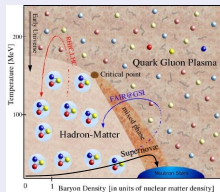
PROPERTIES OF DENSE AND HOT MATTER

A SKETCH OF THE QCD PHASE DIAGRAM



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A SKETCH OF THE QCD PHASE DIAGRAM



- Strong interaction part most difficult (strongly interacting many-body system!), no first principle calculations from QCD possible except at $\mu \approx 0$

- Conditions in compact stars not realisable in laboratories :
 - ▶ extreme density ($\approx 10^{14} \text{g/cm}^3$), temperature (0 – 100 MeV) and composition (timescale allows for weak interactions to equilibrate → very neutron rich matter)
 - ▶ very intense magnetic field (magnetars with surface fields of $10^{14} - 10^{15} G$)
 - ▶ extreme conditions for neutrinos (matter dense enough to become opaque!)
- Valuable observations from many sources, in particular radio (SKA!) and X-ray (e.g. XMM-Newton → Athena), gravitational waves (Virgo), neutrinos (Super-K, IceCube)