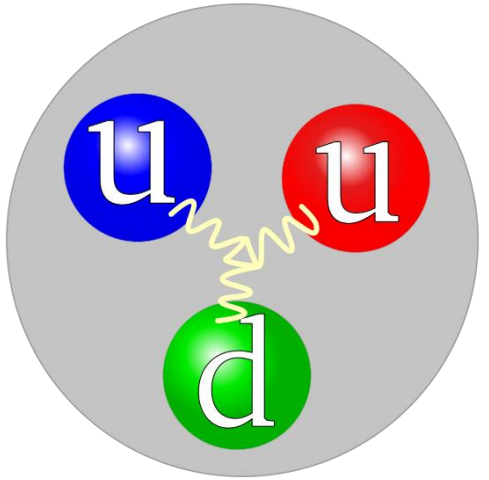
Derek Anderson

Warrior Scholars Meet & Greet

June 28th, 2018

An (Extremely) Quick Introduction to Heavy-Ions

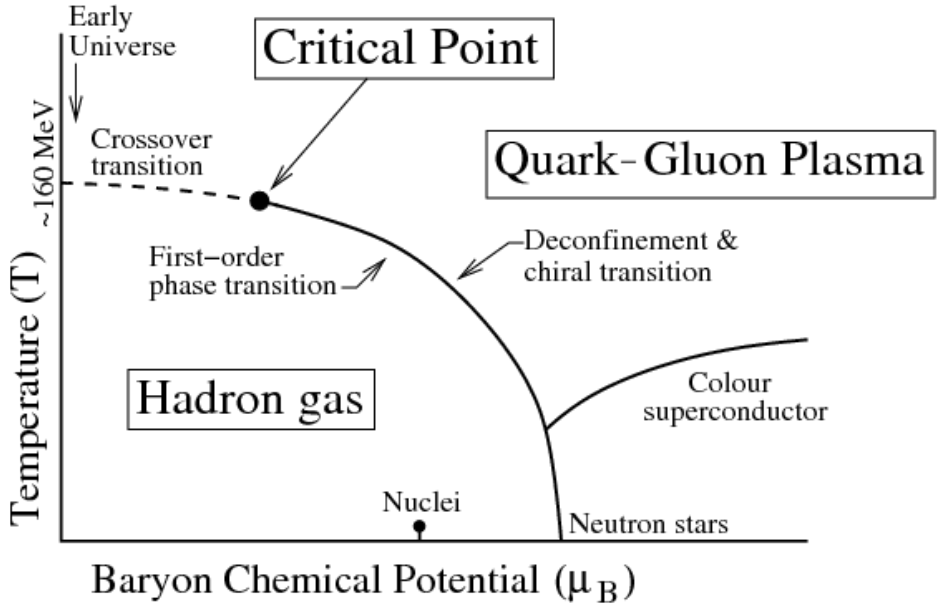
From Nuclei to QGP



www.Wikipedia.org

- Nuclei are not fundamental particles: made of **Quarks** and **Gluons** (i.e. **Partons**)
  - » Interact via the strong nuclear force
  - » Always confined to “hadrons”

- At high enough temperatures and densities, hadrons melt…
  - » Creates **Quark-Gluon Plasma (QGP):** a plasma of nearly-free partons
  - » Analogous to an electromagnetic plasma

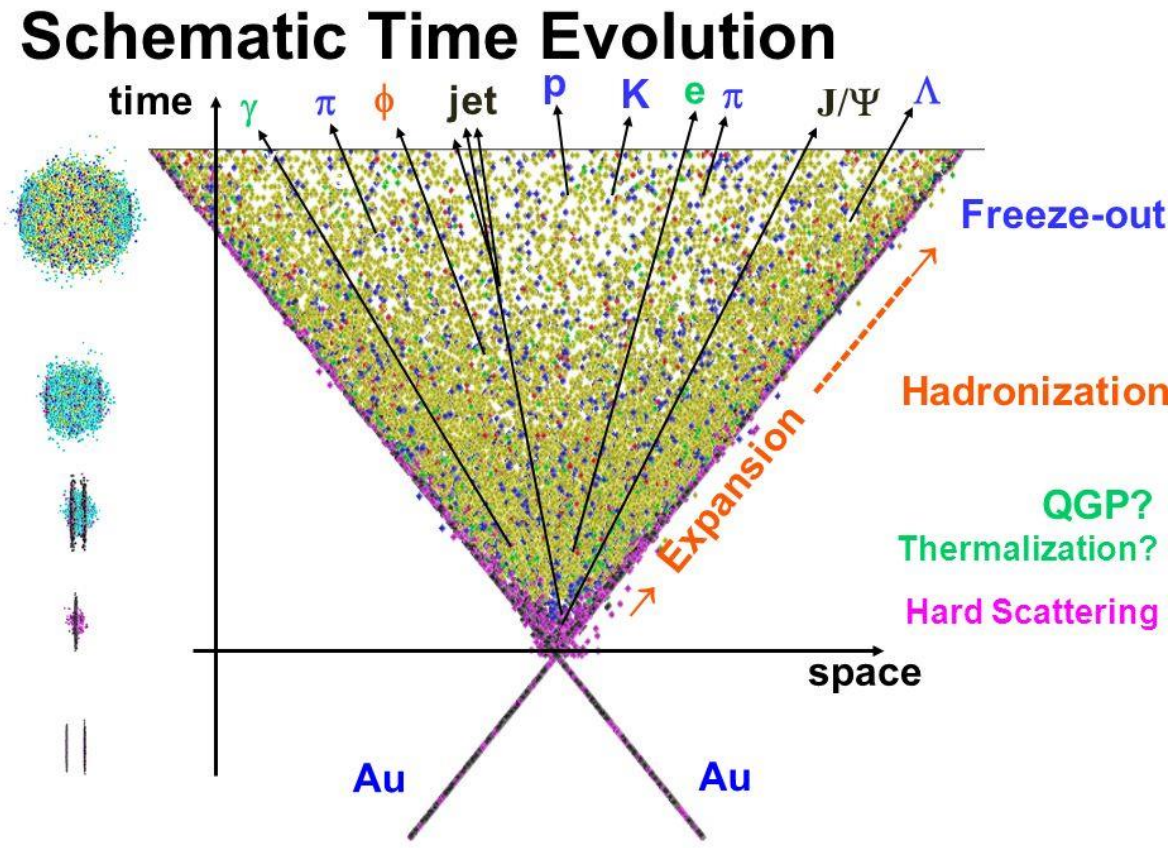


arXiv:1404.3294 [nucl-th]

Heavy Ion Collisions

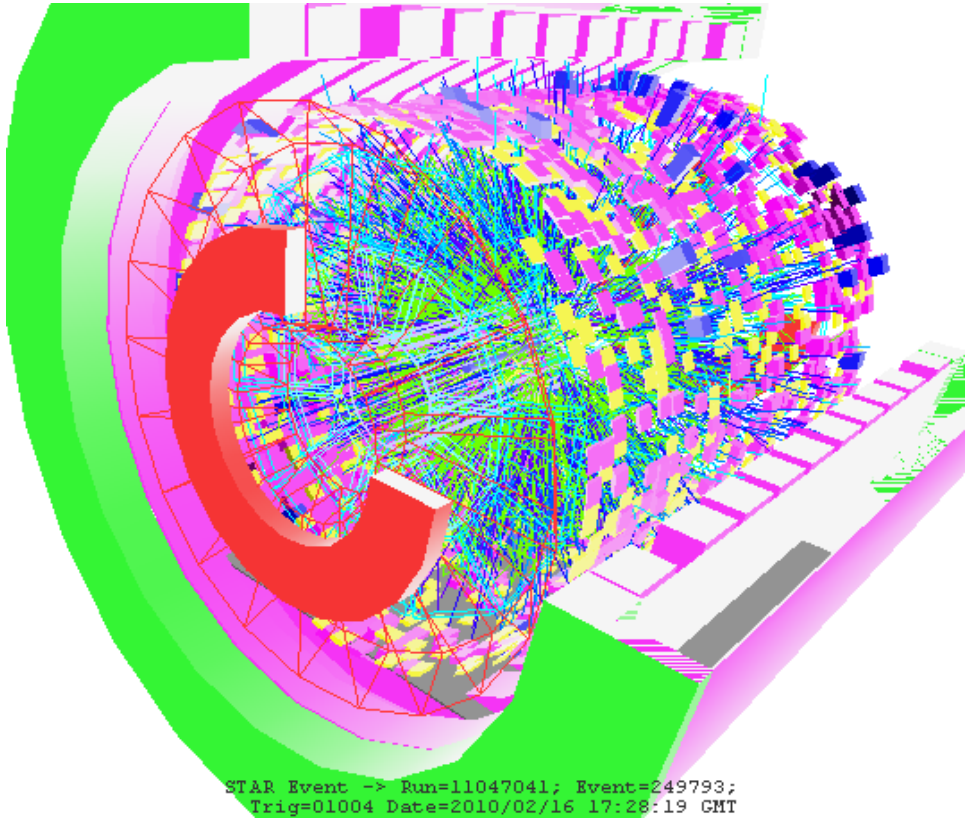
- May be created in Heavy-Ion Collisions
  - » Studied at colliders:
    - – PbPb-collisions at LHC
    - – AuAu-collisions at **RHIC**
  - » Produces medium consistent with a QGP
    - – 7×10^{12} °F at RHIC!

- Heavy-Ion Collisions provide experimental study of…
  - » Fundamental physics
  - » Cosmology
    - – Universe existed in a QGP-like state shortly after big bang
  - » Astrophysics (Neutron Stars)
  - » Etc.



Adapted from Tatsuya Chujo, JPS RHIC Symposium 2001

Thank You!



- **Title page:** www.chihuly.com
- **Above:** www.flickr.com/photos/brookhavenlab/