PhD Open Days

1. Introduction

70% | 25% | 5%

Dark Energy & Dark Matter

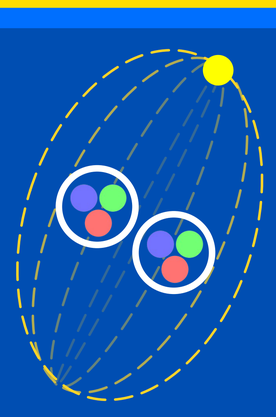
5% is baryonic matter
Matter that makes us. Most of it are baryons → but what are they made out of?

3 quarks, interact via gluons

Strong interaction

Quarks live confined inside baryons

2.1. Motivation

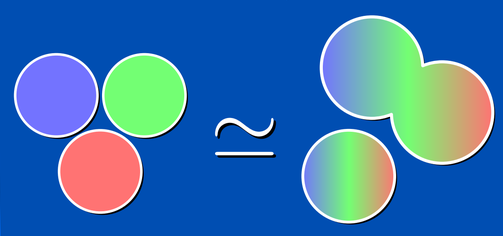


Baryons is a family of particles
Protons & neutrons → baryons!
But there are *hundreds* more!

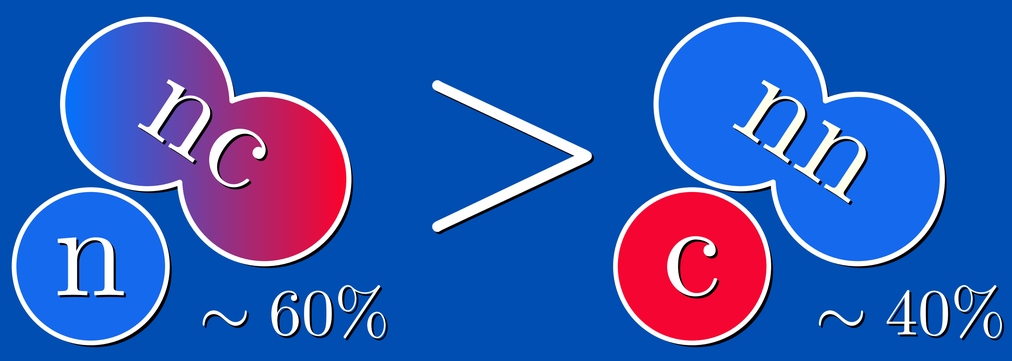
Baryon physics still holds many mysteries
E.g: Proton (uud) = 1000 MeV
u,d = 3 MeV (Higgs) → Not enough!

Solution:
Quantum Chromo Dynamics

2.2. Objective



Heavy baryon spectroscopy using a quark-diquark model



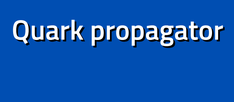
André Torcato (atorcato@lip.pt)

With financial support by

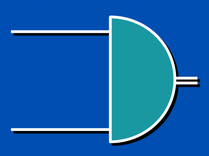
3. Methods

What is needed

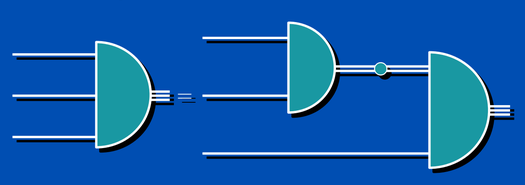
Quark propagator



Diquark amplitude



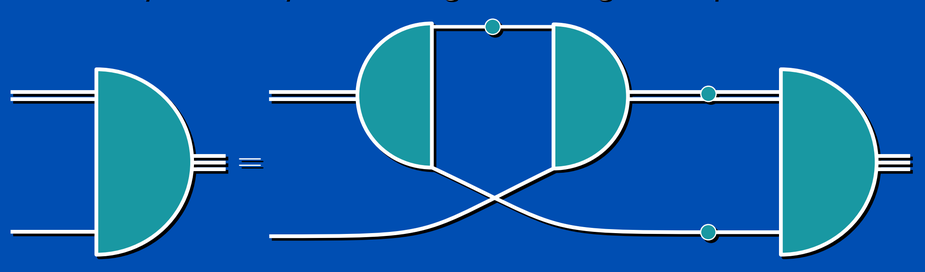
Quark-diquark ansatz



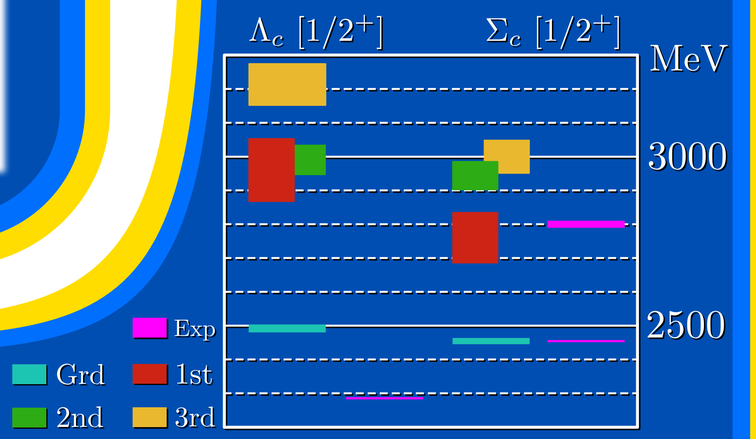
→ Flavors (quark masses)
Quark = {u, d, s, c, b}
Baryon: 5 ⊗ (5 ⊗ 5)
→ Color charge
Quark = {r, g, b}
Baryon: 3 ⊗ (3 ⊗ 3)

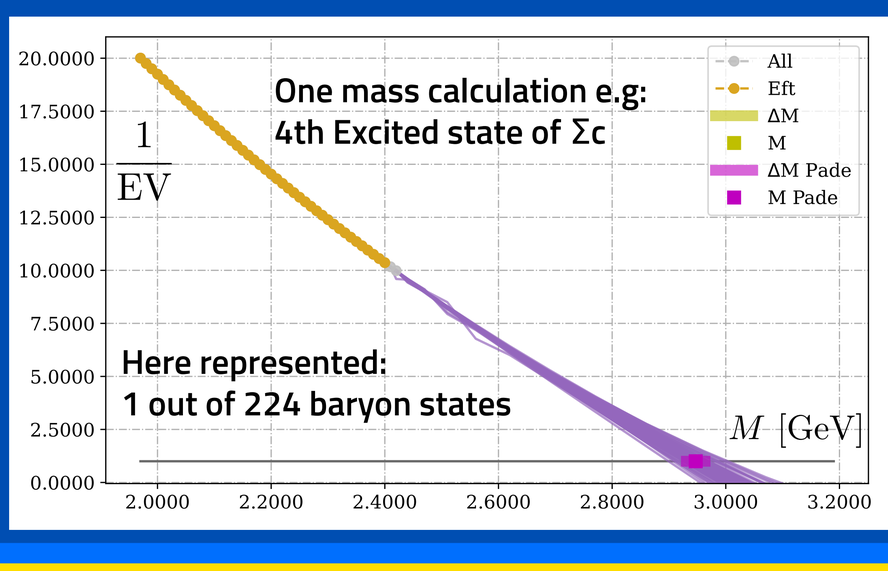
Quark-diquark BSE

Baryon (3-body) as a quark-diquark (2-body) state
Numerically solvable by transforming it into an eigenvalue problem



4. Results





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