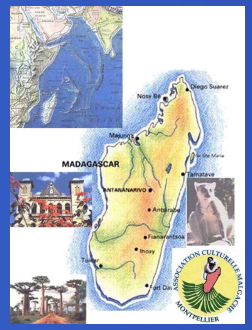

SCALAR MESONS IN QCD

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Light Hadrons Spectroscopy

- Light Quarks:
  u,d,s : $m_q \leq \Lambda_{QCD} \approx$ 350 MeV;
  $Q_u = 2/3; Q_d = Q_s = -1/3$

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- ♡ Light Ordinary Mesons
  $\pi^- \equiv \bar{u}d : J^{PC} = 0^{-+}$; $\rho^- \equiv \bar{u}d : J^{PC} = 1^{--}$;
  $A_1 \equiv \bar{u}d : J^{PC} = 1^{++}$
  Well understood in QCD : associated resp. to the pseudoscalar, vector and axial-vector currents.

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  - Different interpretations

  - ordinary $\bar{q}q$
  - four-quark states
  - gluon bound states for the I=0

$\bar{q}q$ and gluonium interpretations

- I=1 scalar : $a_0(980),\ \kappa(800)$
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- I=0 scalar : $\sigma(800),\ f_0(980)$
  - Can be explained as 1/2 $\bar{q}q$ and 1/2 gluonium states : associated to Trace of the QCD energy-momentum tensor current : $\Theta^{\mu}_{\mu} = \sum m_j \bar{\psi}_j \bar{\psi}_j + (1/4)\beta(\alpha_s)G^2$.

Using QCD Spectral Sum Rules

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