Quark Confinement

- Quark interactions at low momentum transfer are studied focussing on the confinement phenomenon.

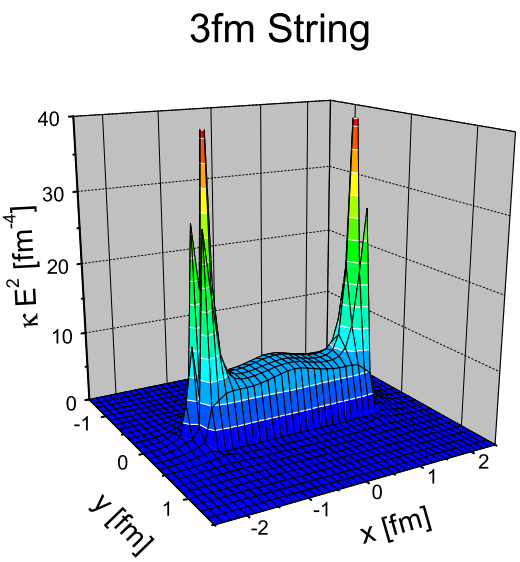
- We use the QCD inspired Color-Dielectric-Model (CDM),

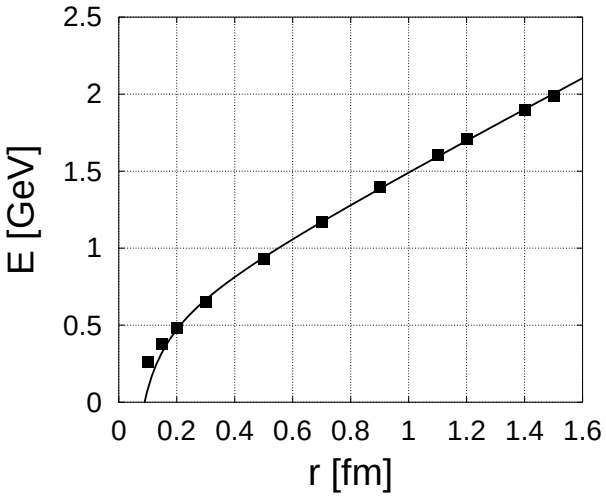
$$
\begin{aligned}
\mathcal{L} &= -\sum_k m_k \sqrt{1-\dot{\vec{x}}_k}\; w\left(\vec{x}-\vec{x}_k(t)\right) \\
&\quad -g\; j^a_\mu\, A^{\mu,a} \\
&- \tfrac{1}{4}\kappa(\sigma) F^a_{\mu\nu} F^{\mu\nu,a} \\
&+ \tfrac{1}{2}\partial_\mu\sigma\partial^\mu\sigma - U(\sigma) \\
F^{\mu\nu,a} &= \partial^\mu A^{\nu,a} - \partial^\nu A^{\mu,a}, \quad a \in \{3,8\} \\
j^{\mu,a} &= \sum_k q^a_k\; u^\mu_k\; w\left(\vec{x}-\vec{x}_k(t)\right) = (\rho^a, \vec{\jmath}^{\,a})
\end{aligned}
$$

- and solve the corresponding equations of motion numerically for given quark configurations, i. e. in Abelian approximation $a \in \{3,8\}$

Results

1 We observe sharply bounded $q\bar{q}$ flux tubes and reproduce the profiles calculated in lattice QCD.





2 We extract the $q\bar{q}$ potential and find the expected Cornell like form.

3 The qqq (baryon) potential supports the Δ (triangle) against the Y (mercedes star) like picture.