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LHC and RHIC as Glueball Factories - Pure Gauge 1. Order Phase Transition in pp, pA and AA and direct GlueBall-Hagedorn hadronization

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pp, pA and AA collisions at RHIC, LHC, FCC and in cosmic rays show according to QCD transport theory (Blaizot et al, Biro et al, Alam et al, Shuryak et al, Xu et al, Senzel et al) fast (over)saturation and chemical equilibration of gluons, t_g « 1fm/c. In stark contrast, soft light quarks are according to these calculations created much more slowly (saturation times t_q » 3 fm/c).

Hence, a change of paradigm seems appropriate for decribing the initial states of collisions at collider energies:

- the system evolves from a CGC through the Glasma state (McLerran and Venugopalan) -into a saturated pure gauge Yang Mills quarkless gluon plasm.
- This 'pure' glue plasma expands until it reaches the 1. Order Phase Transition FOPT with a critical temperature T_c˜270MeV to the GlueBall fluid as predicted by pure gauge thoery (Svetitsky&Yaffe, Brown et al, Meyer, Borsanyi et al). As expansion continues at T_c, the heavy Hagedorn glueballs undergo a sequential two body decay chain directly into the final hadrons, with hadron yield ratios and slopes as observed in pp and AA collisions.

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