Glueballs and mesons in the superfluid phase of two color QCD

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QCD with two color undergoes a transition to a superfluid phase with diquark condensate when the quark chemical potential equals half the pion mass. We investigate the interrelation of confinement and superfluid transition by inspecting the behavior of the glueball correlators evaluated via a multi-step smearing procedure as well as scalar mesons and diquarks at low temperature and several chemical potential ranging from zero to the saturation threshold. The results are based on an analysis of glueball states with zero momentum in the $A_{1}^{++}$ (one-dimensional) and $E^{++}$ (2-dimensional) irreducible representations of the of the relevant cubic point group , on a sample of O(10000) independent correlators on each parameter set. The glueball masses change very little at the transition, supporting the view that the superfluid transition is not deconfining, while the amplitude of the propagators drop, suggesting a strong reduction of the gluon condensate. The analysis of the smearing dependence of the results help disentangling the role of long and short distance phenomena at the superfluid transition.