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## Recent progress in understanding gauge topology, confinement and chiral symmetry breaking

*Monday 28 September 2015 11:15 (20 minutes)*

Instantons for a long time were associated with breaking of  $U(1)$  and  $SU(N_f)$  chiral symmetries in QCD-like theories. Monopoles, on the other hand are related to dual superconductor picture and confinement. Instanton-dyons are instanton constituents, discovered in 1998 by van Baal and others: they incorporate properties of both instantons and monopoles. Recently several papers, both analytic and numerical simulations, have studied ensemble of the instanton-dyons. The results indeed show that in this way one can explain BOTH confinement and chiral symmetry breaking, when the ensemble is dense enough (at strong enough coupling or small temperature). The details can be found in the references below.

Interacting Ensemble of the Instanton-dyons and Deconfinement Phase Transition in the  $SU(2)$  Gauge Theory  
Rasmus Larsen, Edward Shuryak (SUNY, Stony Brook). Apr 13, 2015. 11 pp.  
e-Print: arXiv:1504.03341

Confining Dyon-Anti-Dyon Coulomb Liquid Model I  
Yizhuang Liu (Stony Brook U.), Edward Shuryak, Ismail Zahed (SUNY, Stony Brook). Mar 10, 2015. 17 pp.  
e-Print: arXiv:1503.03058

Light Quarks in the Screened Dyon-Anti-Dyon Coulomb Liquid Model II  
Yizhuang Liu, Edward Shuryak, Ismail Zahed (SUNY, Stony Brook). Mar 31, 2015. 16 pp.  
e-Print: arXiv:1503.09148

### **On behalf of collaboration:**

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