



# PHYSICS COLLOQUIUM

## The Quest for Spinning Glue



### Bernd Surrow

MIT

Host: Smith

**Abstract:** Scattering experiments have played an important role in our current understanding of the world around us. This field aims to answer profound questions such as the origin of the proton mass and spin. Numerous experimental results contributed in the last decades to the test and exploration of the field theory among quarks and gluons known as Quantum Chromodynamics (QCD). In contrast to physics at a large distance scales (e.g. atomic, molecular and nuclear), the mass of the proton originates predominantly in the interactions among its constituents, rather than in the bare masses of the constituents themselves. The strong force that confine quarks inside the proton lead to abundant gluons and quark-antiquark pairs. Those are crucial silent partners in matter, making dominant contributions to the mass of the visible universe. It is not yet completely known how these silent partners also make critical contributions to fundamental properties of the proton other than mass such as the spin of the proton. The high-energy spin physics program at the RHIC facility at Brookhaven National Laboratory focuses on the collision of high-energy polarized protons to gain a deeper understanding of the spin structure and dynamics of the proton, in particular to provide better insight into the role of gluons to make up the spin of the proton. After an introduction into this field, I will review experimental results for gluons making up a large contribution to the proton followed by first results obtained on the quest for spinning glue. I will conclude with an overview of planned measurements in the future.

2241 Chamberlin Hall • Friday, March 14, 2008 • 4:00 P.M.