

# PHYSICS AND ASTRONOMY COLLOQUIUM

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What makes the proton spin?

For the past 30 years, there has been an intense world-wide effort to understand how the quarks and gluons that make up the proton organize themselves to produce its spin of  $1/2 \hbar$ . The primary tool in this quest has been deep-inelastic scattering of polarized electrons and muons off polarized protons. A surprising discovery has been that the spins of the quarks and anti-quarks only contribute  $\sim 1/3$  of the proton spin. During the past decade, the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Lab has enabled a new, complementary probe, high-energy polarized pp collisions. The RHIC spin program has provided essential new insights, including evidence that the gluons in the proton are polarized and may even contribute a larger fraction of the proton spin than the quarks do. In this talk, I'll discuss what we've learned from the RHIC spin program, and where we are heading over the next several years.



**THURSDAY, MARCH 26, 2015 | 4:00 PM | HAWKING AUDITORIUM**



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