Prospects for the Lifetime Difference in the B_s System

We have estimated the expected precision of the measurement of the relative decay width difference $\Delta\Gamma/\overline{\Gamma}$ as a function of integrated luminosity per experiment. Within the framework of the SM, the B_s^0 mesons are expected to mix in such a way that the mass and decay width differences between the heavy and light eigenstates, $\Delta M \equiv M_H - M_L$ and $\Delta\Gamma \equiv \Gamma_L - \Gamma_H$, are sizeable. The mixing phase $\delta\phi$ is small and to a good approximation the two mass eigenstates correspond to CP eigenstates. New phenomena may alter $\delta\phi$, leading to a reduction of the observed $\Delta\Gamma/\overline{\Gamma}$ compared to the SM prediction.

The estimates presented here are based on DØ studies, and an assumption is made that the CDF net sensitivity is about the same. (CDF has a better mass resolution, hence less background under the signal, while DØ has a larger polar angle coverage).

The DØ estimate of $\sigma(\Delta\Gamma/\overline{\Gamma})$ is based on a full Run IIa MC simulation (Geant and event reconstruction). Results are then scaled to take into account the anticipated detector upgrade (SMT "Layer 0") and an upgraded analysis (three angles as opposed to the "tranversity-only" approach of *"Measurement of the Lifetime Difference in the B_s^0 System"*, Fermilab-Pub-0503240E).