Contribution ID: **76** Type: **not specified**

# Collectivity from interference

*Tuesday 12 December 2017 19:00 (15 minutes)*

In hadronic collisions, interference between different production channels affects momentum distributions of multi-particle final states. As this QCD interference does not depend on the strong coupling constant $\alpha_s$, it is part of the no-interaction baseline that needs to be controlled prior to searching for other manifestations of collective dynamics, e.g., in the analysis of azimuthal anisostropy coefficients $v_n$ at the LHC. Here, we introduce a model that is based on the QCD theory of multi-parton interactions and that allows one to study interference effects in the production of $m$ particles in hadronic collisions with N parton-parton interactions (âsourcesâ). In an expansion in powers of $1/(N_c^2-1)$ and toleading order in the number of sources N, we calculate interference effects in the $m$-particle spectra and we determine from them the second and fourth order cumulant momentum anisotropies $v_n\{2\}$ and $v_n\{4\}$. Without invoking any azimuthal asymmetry and any density dependent non-linear dynamics in the incoming state, and without invoking any interaction in the final state, we find that QCD interference alone can give rise to values for $v_n\{2\}$ and $v_n\{4\}$ even, that persist unattenuated for increasing number of sources, that may increase with increasing multiplicity and that agree with measurements in proton-proton (pp) collisions in terms of the order of magnitude of the signal and the approximate shape of the transverse momentum dependence. We further find that the non-abelian features of QCD interference can give rise to odd harmonic anisotropies. These findings indicate that the no-interaction baseline including QCD interference effects can make a sizeable if not dominant contribution to the measured $v_n$ coefficients in pp collisions. Prospects for analyzing QCD interference contributions further and their possible relevance for proton-nucleus and nucleus-nucleus collisions are discussed shortly.

**Authors:** BLOK, Boris (Physics Department); WIEDEMANN, Urs (CERN); STRIKMAN, Mark (Pennsylvania State University (US)); JÄKEL, Christian D.

**Presenter:** BLOK, Boris (Physics Department)

**Session Classification:** WG5: High Multiplicities