Identifying the underlying physics of the ridge via 3-particle $\Delta\eta - \Delta\eta$ correlations in STAR

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Dihadron correlations provide a powerful tool to study the properties of the medium created at RHIC. One of the novel observations is the formation of the near-side ridge, where hadrons are correlated with a high transverse momentum (p_T) trigger particle in the azimuthal angle ($\Delta\phi \sim 0$) but distributed approximately uniformly in pseudorapidity ($\Delta\eta$). This observation has prompted many theoretical investigations, including longitudinal flow push, QCD bremsstrahlung radiation boosted by transverse flow, recombination between thermal and shower partons at intermediate p_T, broadening of quenched jets in turbulent color fields, elastic collision between hard and medium partons (momentum kick) and back splash from the away-side stopped parton. To potentially discriminate between these different physics mechanisms we present the first study of 3-particle correlation in $\Delta\eta$-$\Delta\eta$ by the STAR experiment. Preliminary results will be presented for $Au + Au$ and d+Au collisions at $\sqrt{s}_{NN}$ = 200 GeV. The results are studied as a function of trigger (p_T >3 GeV/c) and associated particle (p_T >1 GeV/c) p_T and collision centrality. Implications of the results in the context of the theoretical models will be discussed.