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## Non-linear anisotropic flow with ideal and viscous hydrodynamics

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The particle spectrum from RHIC and LHC can be decomposed into harmonic series that defines the dipolar flow  $v_1$ , the elliptic flow  $v_2$ , the triangular flow  $v_3$ , and  $v_4$ , and  $v_5$  etc. To understand the origin of higher order harmonics, we extend the linear response formalism for anisotropic flow to include the non-linear response which results from the interactions between the lowest harmonics and the elliptic flow. For example,  $v_{5(23)}/(\epsilon_2\epsilon_3)$  records the  $v_5$  generated by the non-linear interactions between  $v_2$  and  $v_3$ . Ideal and viscous hydrodynamic calculations show that the non-linear response becomes dominant for  $n=4$  and  $n=5$  in non-central collisions. This trend is much more pronounced for viscous hydrodynamics where the linear response for  $n=4$  and  $n=5$  is negligible.

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