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Degenerations of Hodge structures

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Two motivating questions from algebraic geometry are: how can a smooth projective variety degenerate? and what are the "relations" between two such degenerations? One way to gain insight into these questions is to ask the analogous questions of invariants associated with the smooth projective varieties. In this case, the invariant that we have in mind is a polarized Hodge structure. (And indeed detailed analysis of degenerations of polarized Hodge structures can be used to better understand degeneration of smooth projective varieties, and moduli spaces and their compactifications.)

I will explain how the work of Cattani, Kaplan and Schmid allows us to view a polarized limiting mixed Hodge structure (PLMHS) as a degeneration of a polarized Hodge structure. There is a notion of "polarized relation" between PLMHS that encodes information on how varieties may degenerate within a family. I will give a classification of PLMHS and their polarized relations in terms of Hodge diamonds (discrete data associated with a PLMHS), effectively answering the Hodge-theoretic analogs of the two motivating questions above.

This is joint work with Matt Kerr and Greg Pearlstein.

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