Transcendence conjectures for Shimura Varieties and Period maps

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Shimura varieties (S) are uniformized by symmetric spaces (H), and the uniformization map $\Pi : H \longrightarrow S$ is quite transcendental. Understanding the interaction of this map with algebraic structures is of particular interest in arithmetic, as it is a necessary ingredient for the modern approaches to the Andre-Oort and Zilber-Pink conjectures.

With N.Mok and J.Pila, we establish an analogue of the Ax-Schanuel theorem in this context, which essentially says that any atypical algebraic relations between subvarieties in H and S are governed by Shimura subvarieties. We also discuss generalizations to arbitrary period maps, and arithmetic applications.