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EQUIVARIANT HOLOMORPHIC MAPS OF SYMMETRIC DOMAINS

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0. Introduction. Let G be a $\mathbb{Q}$-simple algebraic group of Hermitian type. (That is, for $G(\mathbb{R})$ the set of real points of G and K a maximal compact subgroup, G/K is a Hermitian symmetric space.) A problem posed by Kuga and Satake in the 1960s is to classify all representations of G into a symplectic group over $\mathbb{Q}$ together with all equivariant holomorphic maps of the corresponding symmetric spaces. These representations may be used to construct families of Abelian varieties (Kuga fiber varieties). In the case where $G(\mathbb{R})$ ha no compact simple factors, the problem was solved by Satake in [S1], [S2]. (It turns out there are only a few such representations.) In this paper, we solve the problem for groups corresponding to symmetric domains of types II and III (groups with compact factors). In contrast to Satake's case, there are in general many such representations, describable by a combinatorial scheme called "chemistry". Many results about families of Abelian varieties can be expressed in terms of the chemistry of the representations used to construct them. In particular, the fiber varieties constructed using chemistry are nonsingular projective varieties and need no compactification.

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