On the local-global divisibility problem over abelian surfaces

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Let k be a number field and let A be a commutative algebraic group defined over k. Consider the following question:

Problem. Let P be in $A(k)$ and let q be a positive integer. Suppose that for all but finitely many places v of k, there exists $D_v \in A(k_v)$ such that $P = qD_v$. Does there exist $D \in A(k)$ such that $P = qD$?

This problem is called *Local-global divisibility problem* by q on A over k. If for every $P \in A(k)$ the answer to the *Local-global divisibility problem* is positive, we say that the *Local-global divisibility principle* for divisibility by q holds for A over k.

In a joint work with Laura Paladino and Evelina Viada, we got a criterion for the *Local-global divisibility problem* in the particular case when A is an elliptic curve. Very recently, with Florence Gillibert, we generalized the criterion to the family of principally polarized abelian surfaces. In our talk we explain this last result.