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Lance Edward Miller*, Department of Mathematical Sciences, SCEN 309, 1 University of Arkansas, Fayetteville, AR 72701, and **Alexandru Buium**. *Finiteness of quasi-canonical lifts of elliptic curves*. Preliminary report.

Fix a prime integer p . Set R the completed valuation ring of the maximal unramified extension of \mathbb{Q}_p . For $X := X_1(N)$ the modular curve with N at least 4 and coprime to p , Buium-Poonen in 2009 showed that the locus of canonical lifts enjoys finite intersection with preimages of finite rank subgroups of $E(R)$ when E is an elliptic curve with a surjection from X . This is done using Buium's theory of arithmetic ODEs, in particular interesting homomorphisms $E(R) \rightarrow R$ which are arithmetic analogues of Manin maps. In this talk, I will review an advance on the theory which allows for ramification resulting in existence of multiple Frobenius lifts, i.e., a theory of arithmetic PDEs. This theory produces genuinely new "Manin maps" which then will then be applied to obtain analogous finiteness result for quasi-canonical lifts, i.e., those curves with Serre-Tate parameter a root of unity. All of this is joint work with A. Buium. (Received August 30, 2021)