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**Alexandra Shlapentokh\*** (shlapentokha@ecu.edu), Department of Mathematics, East Carolian university, Greenville, NC 27858. *Diophantine Definability and Decidability in the Extensions of Degree 2 of Totally Real Fields*. Preliminary report.

We investigate Diophantine definability and decidability over some subrings of algebraic numbers contained in quadratic extensions of totally real algebraic extensions of  $\mathbf{Q}$ . Among other results we prove the following. The big subring definability and undecidability results previously shown by the author to hold over totally complex extensions of degree 2 of totally real number fields, are shown to hold for *all* extensions of degree 2 of totally real number fields. The definability and undecidability results for integral closures of “small” and “big subrings” of number fields in the infinite algebraic extensions of  $\mathbf{Q}$ , previously shown by the author to hold for totally real fields, are extended to a large class of extensions of degree 2 over totally real fields. These class includes infinite cyclotomics and abelian extensions with finitely many ramified rational primes. (Received January 24, 2006)