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Identity-Based (Lossy) Trapdoor Functions and Applications

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Abstract: We provide the first constructions of identity-based (injective) trapdoor functions. Furthermore, they are lossy. Constructions are given both with pairings (DLIN) and lattices (LWE). Our lossy identity-based trapdoor functions provide an automatic way to realize, in the identity-based setting, many functionalities previously known only in the public-key setting. In particular we obtain the first deterministic and efficiently searchable IBE schemes and the first hedged IBE schemes, which achieve best possible security in the face of bad randomness. Underlying our constructs is a new definition, of partial lossiness, that may be of broader interest.

Category / Keywords: Identity-based encryption, pairings, lattices, lossiness

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