Towards a correctly rounded power function in double precision

We design algorithms for the correct rounding of the power function $(x, y) \mapsto x^y$ in the binary64 IEEE 754 format, for all rounding modes, modulo the knowledge of hardest-to-round cases. Our implementation of these algorithms largely outperforms previous correctly-rounded implementations and is not far from the efficiency of current mathematical libraries, which are not correctly-rounded. The proofs of correctness of the first (and most used) phase of our algorithm have furthermore been formalized in Coq.

This talk will dress an overview of the methods used to achieve this result.