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Ilya Dumer* (dumer@ee.ucr.edu) and **Olga Kapralova**. *Evaluating Boolean polynomials on Hamming spheres.*

Consider m -variate Boolean polynomials of degree r or less defined on all binary m -tuples and let these polynomials be evaluated on the m -tuples of a given Hamming weight b . From the coding perspective, this setting defines a shortened binary Reed-Muller code $\text{RM}(r, m)$ whose positions form a Hamming sphere of weight b in the binary m -dimensional space. In this talk, we specify some recursive properties of this single-layer construction and define its code parameters for arbitrary values of m, r , and b . For growing m , we also study some multi-layer constructions of low code rates. We then propose efficient decoding algorithms that achieve a vanishing decoding error probability if these codes are being used over the high-noise channels with a transition error probability that approaches $1/2$. (Received September 25, 2012)