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Aramaki-Aza-Aoba, Aoba-ku, Sendai, 980-8579, Japan, and **Yan Zhu**. *Tight relative t -designs on two shells in hypercubes, and Hahn and Hermite polynomials.*

The concept of relative t -designs in the n -dimensional hypercube \mathcal{Q}_n introduced by Delsarte (1977) is a generalization of that of combinatorial t - (n, k, λ) designs which allows multiple block sizes as well as weights, and is equivalent to that of regular t -wise balanced designs. In this talk, we focus on the relative t -designs with t even, which have precisely two block sizes, and which are tight, i.e., the Fisher-type lower bound on the sizes due to Bannai and Bannai (2012) is met with equality. We generalize several structural results about tight t -designs to this case. In particular, it follows that such relative t -designs induce coherent configurations with two fibers. We also have a counterpart of the Wilson polynomial, which is a special case of the Hahn polynomials. We then apply Bannai's method (1977) on the zeros of the Hahn and Hermite polynomials to obtain parametric restrictions on the existence of such relative t -designs. (Received July 13, 2019)