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**Joris Roos\*** (jroos@math.wisc.edu).  *$L^p$  improving estimates for maximal spherical and circular averages.*

For a given compact set of radii  $E$  we will discuss  $L^p$  improving properties of maximal spherical averages with a supremum over  $E$  in dimensions two and higher. Our results are sharp for a large class of  $E$ . A surprising feature is that results depend on the Assouad dimension of the set  $E$  and also its Assouad spectrum, a notion that was recently introduced by J. M. Fraser and H. Yu. This talk is based on joint works with Tess Anderson, Kevin Hughes and Andreas Seeger. (Received September 16, 2019)