1135-35-2655 **Changfeng Gui** and **Amir Moradifam*** (amirm@ucr.edu). *The Sphere Covering Inequality and Its Applications.*

We show that the total area of two distinct Gaussian curvature 1 surfaces with the same conformal factor on the boundary, which are also conformal to the Euclidean unit disk, must be at least 4π. In other words, the areas of these surfaces must cover the whole unit sphere after a proper rearrangement. We refer to this lower bound of total areas as the Sphere Covering Inequality. This inequality and it's generalizations are applied to a number of open problems related to Moser-Trudinger type inequalities, mean field equations and Onsager vortices, etc, and yield optimal results. In particular we confirm the best constant of a Moser-Truidinger type inequality conjectured by A. Chang and P. Yang in 1987. This is a joint work Changfeng Gui. (Received September 26, 2017)