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DIFFUSION ON SURFACES OF FINITE SIZE: MÖSSBAUER EFFECT AS A PROBE

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In this manuscript, we present a theoretical analysis of the Mössbauer spectrum of a particle diffusing on surfaces of finite size. The spectrum exhibits a broadening of the linewidth, which has a characteristic size dependence associated with it. We present explicit results for spherical surfaces and discs with various types of boundary conditions. The spectrum is sensitive to the type of boundary condition. The Mössbauer spectrum can be used as an independent technique for surface

diffusion studies, and can be compared with the results obtained from field ion microscopy investigations. Field ion microscopy studies focus on the mean squared displacement of the particles. Using the same formalism, we present results for the mean squared displacement of particles on small domains subject to varying boundary conditions.