**Anomalous diffusion and mixed dynamics**

**in a classical Bose-Hubbard chain**

D. Markovic1,2 and M. Cubrovic2

1*Department of Physics, University of Belgrade,*

*Studentski Trg 12-16, Belgrade, Serbia*

2*Center for the Study of Complex Systems, Institute of Physics Belgrade,*

*Pregrevica 118, 11080 Belgrade, Serbia*

e-mail: [vokramnagard@gmail.com](mailto:vokramnagard@gmail.com), [cubrovic@ipb.ac.rs](mailto:cubrovic@ipb.ac.rs)

We study chaos and anomalous transport in a Bose-Hubbard chain in the semiclassical regime (the limit when the number of particles goes to infinity), which allows us to solve long chains with up to hundred sites. We find that the system has mixed phase space with both regular and chaotic dynamics. The consequence is strongly anomalous diffusion with a discrete set of scaling exponents, which after very long times crosses to the thermalized regime with normal diffusion. We corroborate our findings with analytical arguments from thermodynamics and Langevin equations.