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A Langevin model for low density pedestrian dynamics ALESSANDRO CORBETTA, Eindhoven University of Technology, CHUNG-MIN LEE, California State University Long Beach, ROBERTO BENZI, University of Rome Tor Vergata, ADRIAN MUNTEAN, Karlstad University, Sweden, FEDERICO TOSCHI, Eindhoven University of Technology — The dynamics of pedestrian crowds shares deep connections with statistical physics and fluid dynamics. Reaching a quantitative understanding, not only of the average behaviours but also of the statistics of (rare) fluctuations would have major impact, for instance, on the design and safety of civil infrastructures. A key feature of pedestrian dynamics is its strong intrinsic variability, that we can already observe at the single individual level. In this work we aim at a quantitative characterisation of this statistical variability by studying individual fluctuations. We consider experimental observations of low-density pedestrian flows in a corridor within a building at Eindhoven University of Technology. Few hundreds of thousands of pedestrian trajectories with high space and time resolutions have been collected via a Microsoft Kinect 3D-range sensor and automatic head tracking techniques. From these observations we model pedestrians as active Brownian particles by means of a generalised Langevin equation. With this model we can quantitatively reproduce the observed dynamics including the statistics of ordinary pedestrian fluctuations and of rarer U-turn events. Low density, pair-wise interactions between pedestrians are also discussed.

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