Contribution submission to the conference Berlin 2012

Physics in penguin colonies — •Daniel P. Zitterbart[1,2], Sebastian Richter[1], Celine Le Bohec[3], Werner Schneider[1], Claus Metzner[1], Richard Gerum[1], Barbara Wienecke[4], and Ben Fabry[1] — [1]Biophysics Lab, Department of Physics, University of Erlangen, Germany — [2]Ocean Acoustics Lab, AWI, Bremerhaven — [3]IPHC, Centre National de la Recherche Scientifique, Strasbourg, France — [4]Australian Antarctic Division, Australia

In polar regions, highly adapted social behavior is crucial for the survival of several species. One prominent example is the huddling behavior of Emperor penguins. To understand how Emperor penguins solve the physical problem of movement in densely packed huddles, we observed an Emperor penguin colony (Atka Bay) with time-lapse imaging and tracked the positions of more than 1400 huddling penguins. The trajectories revealed that Emperor penguins move collectively in a highly coordinated manner to ensure mobility while at the same time keeping the huddle tightly packed. Every 30 - 60 seconds, all penguins make small steps, which travel as a wave through the entire huddle. Over time, these small movements lead to large-scale reorganization of the huddle. Our data show that the dynamics of penguin huddling is governed by intermittency and approach to kinetic arrest in striking analogy with inert non-equilibrium systems. We will also present observations from a different Emperor penguin colony (Adélie Land), an Adélie penguin colony (Adélie Land), and a King penguin colony (Crozet Island).

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