Random organization: A dynamical phase transition LAURENT CORTE, DAVID J. PINE, PAUL M. CHAIKIN, Center for Soft Matter Research, NYU — We introduce a simple model motivated by recent experiments in sheared suspensions. We show that completely random displacements of colliding particles are sufficient to generate an organized state where further collisions are suppressed. This organization by self-activated random walkers presents a much more efficient process than when all particles are diffusing. It only occurs provided that the density in particle is lower than a critical value $\rho_c$ and is characterized by a dynamical phase transition. A mean-field description captures the existence of this transition. It suggests that the value of $\rho_c$ is determined by the ratio $p_s/p_c$, where $p_s$ is the probability for a pair of colliding particles to separate and $p_c$ is the probability that a “quiet” particle be collided. Our results also reveal that the ordering can be enhanced by straining the system periodically. However, these more organized states become less and less accessible as the strain amplitude is increased.