Dispersion Processes

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We study a synchronous dispersion process in which M particles are initially placed at a distinguished *origin vertex* of a graph G. At each time step, at each vertex v occupied by more than one particle at the beginning of this step, each of these particles moves to a neighbour of v chosen independently and uniformly at random. The dispersion process ends at the first step when each vertex has at most one particle.

For the complete graph K_n and star graph S_n we demonstrate a threshold for which the time for the process to end, moves with high probability from logarithmic to exponential time. For a range of graph classes of large enough sizes (in terms of M), including trees, grids and Cayley graphs we give bounds on the time to finish and the maximum distance traveled from the origin as a function of the number of particles M.

Joint work with Colin Cooper, Tomasz Radzik, Nicolás Rivera and Takeharu Shiraga