What is the mechanism of power-law distributed Poincaré recurrences in higher-dimensional systems?

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The statistics of Poincaré recurrence times in Hamiltonian systems typically shows a power-law decay with chaotic trajectories sticking to some phase-space regions for long times. For higher-dimensional systems the mechanism of this power-law trapping is still unknown. We investigate trapped orbits of a generic 4D symplectic map in phase space and frequency space and find that, in contrast to 2D maps, the trapping is i) not due to a hierarchy in phase space. Instead, it occurs at the surface of the regular region, ii) outside of the Arnold web. The chaotic dynamics in this sticky region is iii) dominated by resonance channels which reach far into the chaotic region: We observe iii.a) clear signatures of some kind of partial transport barriers and conjecture iii.b) a stochastic process with an effective drift along resonance channels. These two processes lay the basis for a future understanding of the mechanism of power-law trapping in higher-dimensional systems.