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Planet Formation in Magnetized Accretion Disks ANDREW YOUDIN, Harvard Smithsonian Center for Astrophysics — Stars form by the flow of matter through an accretion disk. An efficient mechanism of angular momentum transport is required to drive this flow. The magneto rotational instability (MRI) is the leading candidate (along with self-gravity in the early stages of growth) to drive turbulent momentum transport in disks. I will briefly summarize the current status of MRI turbulence in weakly magnetized circumstellar disks. Then I will describe how MRI turbulence affects the formation of planets. By vigorously mixing small solids, turbulence generally tends to oppose the accumulation into planets. Yet somehow planets form. MRI turbulence has the tendency to launch long-lived, axisymmetric zonal flows. These super- and sub-Keplerian flows surround a pressure maximum which efficiently accumulates cm to m scale solids. These solids are subject to a strong aerodynamic clumping mechanism driven by the streaming instability (Youdin & Goodman, 2005). When sufficiently dense, clumps of small solids collapse gravitationally into 100 km-scale solid planetesimals. This theory of early planet formation is recorded in the asteroid and Kuiper belts of our Solar System, in the debris disks surrounding other stars and in magnetized meteorite fragments that fall to Earth.

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