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Controlling the formation process of vortex states in magnetic nanodots with asymmetric geometry[1] MI-YOUNG IM, PETER FISCHER, CXRO/LBNL, ANDREAS VOGEL, GUIDO MEIER, IAP/U Hamburg — Magnetic vortex structures in nanoscale elements are currently highly attractive, since they offer exciting topological spin configurations to study on a fundamental level nanoscale spin behavior and they show great potential for applications in data storage and memory technologies. One of the primary questions is to tailor the nucleation process of vortex structures, which would open the opportunity for the control of magnetic/spin phenomena in magnetic vortices such as the resonant motion of a magnetic vortex core, etc. We have investigated the stochastical character of the formation process of vortex states in permalloy ($Ni_{80}Fe_{20}$) nanodots with different geometries by direct imaging of vortex structures with high resolution magnetic transmission soft X-ray microscopy (MTXM). We observe that the formation process of vortex state sensitively depends on the geometry of nanodots. Based on our experimental result, we will discuss the possibility to control the generation process of magnetic vortex states by directed modifications of the geometry of nanodots.

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