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**Surface lattice resonances and magneto-optical response in magnetic nanoparticle arrays** TOMMI HAKALA, MIKKO KATAJA, ALEKSI JULKU, MIKKO HUTTUNEN, SEBASTIAAN VAN DIJKEN, PAIVI TORMA, Aalto University — We show that periodic rectangular arrays of magnetic nanoparticles display collective surface plasmon modes which are coupled by the radiation fields from each particle. The two directions of the lattice are coupled by the magnetic-field-controllable spin-orbit coupling in the nanoparticles. When breaking the symmetry of the lattice, we find that the optical response shows Fano-type surface lattice resonances whose frequency is determined by the periodicity orthogonal to the polarization of the incident field. In striking contrast, the magneto-optical Kerr response is controlled by the period in the parallel direction. The spectral separation of the response for longitudinal and orthogonal excitations provides versatile tuning of narrow and intense magneto-optical resonances.

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