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Electrodynamic Tensor Properties of Periodic Arrays[1] DIANA STRICKLAND, Southwest Research Institute, ARTURO AYON, The University of Texas at San Antonio, ANDREA ALU, The University of Texas at Austin — Using a generalized Green function approach, we extend a first principles homogenization theory [1] to derive the complete electrodynamic tensor properties of moderately subwavelength particles in regular arrays. We illustrate the power of this model by investigating arrangements with transverse and axial linear dipole excitations, finding the first fully dynamic tensor properties for cylinder arrays and discovering significant magnetoelectric effects from centrosymmetric, homogenous particles, an effect associated with weak spatial dispersion. This theory is valid for general linear media, including nonreciprocal or active materials. We also expect these results to be useful in describing the response of arrays of particles with complex bianisotropic polarizabilities, in order to synthesize artificially structured materials with exotic properties such as metamaterials. [1] A. Alù, "First-principles homogenization theory for periodic metamaterials," *Physical Review B*, **84**, 075153 (2011).

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