

**Einstein de Haas effect of the electromagnetic quantum vacuum**Bart van Tiggelen

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This work investigates the angular momentum of the electromagnetic quantum vacuum residing in a dielectric Mie sphere subject to the Faraday effect. Longitudinal electric modes are excited on its surface and are also created inside the sphere by the Faraday effect. The electromagnetic quantum vacuum creates a vortex of the Poynting vector that varies as  $1/r$  to the center of the sphere and is associated with longitudinal angular momentum, connected to the vector potential  $A(r, t)$ . It emerges as a non-negligible quantum vacuum correction to the classical (diamagnetic) Einstein-De Haas effect in which an applied external magnetic field - via its action on microscopic magnetism - enforces macroscopic rotation

[1] B.A. van Tiggelen, [\[2105.00821\] Longitudinal Angular Momentum in Magneto-Mie Scattering: Quantum Vacuum Correction to the Einstein-De Haas effect \(arxiv.org\)](#), submitted.