1.**Statistical mechanical approach to the Casimir effect**

a) Friction problem: Statistical mechanics for harmonically oscillating particles in relative motion, at zero and finite temperature.

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b) Casimir force between dielectric media calculated from the path-integral formulation of quantized particles.

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2. **Casimir effect and dispersion**

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3. **Casimir effect for wedges at zero and finite temperature**

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4. **Casimir effects in higher dimensions, and in cosmology**

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Among earlier activities let me also mention

6. **Casimir effect and the Feigel effect**

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Casimir-Polder forces out of thermal equilibrium

(Simen Å. Ellingsen in collaboration with Stefan Scheel, Stefan Buhmann and Alex Crosse, Imperial College London)

A number of set-ups of technological promise involve particles close to surfaces where the particle is not in thermal equilibrium with its environment, where a good description of dispersion forces (Casimir-Polder forces) is of the essence. Prime examples are Bose-Einstein condensates, beams of cold molecules and Rydberg atoms, all of which phenomena which are already used in a range of experimental applications. In describing particles out of equilibrium with its environment, one must move beyond the celebrated Lifshitz theory for thermal equilibrium, and effects of net photon exchange between particle and thermal field must be accounted for. The resulting corrections to the dispersion forces are interesting in their own right, and lead the way to ideas for tailoring of dispersion forces for technological purposes.

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