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(54) Title: APPARATUS, SYSTEM AND METHOD FOR PROVIDING A LIGHT-MATTER INTERFACE FOR ENHANCING TRANSITIONS THAT GENERATE SINGLE PHOTONS

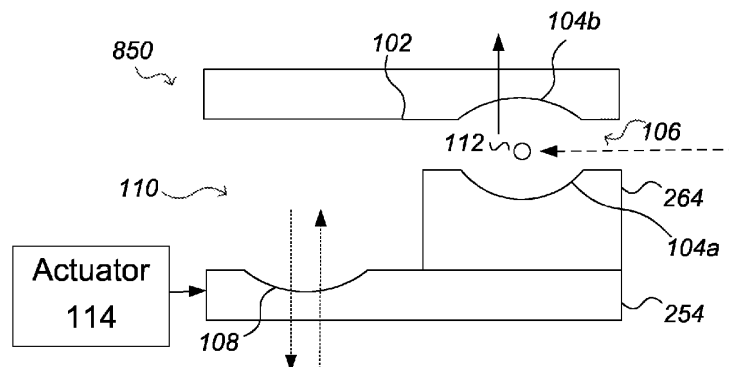


FIG. 8B

(57) Abstract: According to aspects of the disclosure, an apparatus, system and method for providing a light-matter interface for enhancing transitions that generate single photons is provided. The apparatus comprises: a first reflective surface; a locking recess formed in a locking reflective surface, the first reflective surface and locking recess forming a locking cavity to receive light from a locking laser; the portion of light output from the locking cavity indicative of whether the locking cavity is on resonance with the locking laser; an emitting recess formed in an emitting reflective surface, the first reflective surface and emitting recess forming an emitting cavity to receive photons from a single photon emitter material, the single photon emitter material located in the emitting cavity to emit single photons in response to optical or electrical excitation of the material; and an actuator to tune the length of the locking cavity based on the portion of light output from the locking cavity to be on resonance with the locking laser to lock the locking cavity to the locking laser. The locking reflective surface and emitting reflective surface are mechanically coupled such that locking the locking cavity tunes and stabilises the emitting cavity at a single photon emission wavelength. The system comprises: an apparatus for generating single photons; and optics for transmitting light into the locking cavity of the apparatus. In the method of operation, light is received at the locking cavity from a locking laser, and the length of the locking cavity is tuned using the actuator based on the

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portion of light output from the locking cavity to be on resonance with the locking laser to lock the locking cavity to the locking laser. Single photons are then emitted by the single photon emitter material located in the emitting cavity in response to optical or electrical excitation of the material. [Figure 8B]