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Tipo: **Contribution from scientific community**

Implantation of silicon-vacancy single-photon emitters at the Tandetron accelerator of INFN Florence for application in quantum technologies

The 3 MV Tandetron accelerator beamline at LABEC (Florence) has been upgraded to ion implantation experiments for fabrication of single-photon emitters. Silicon ions have been implanted in single- and polycrystalline diamond matrices, in the 0-2.4 μm range of depths (0.2-11 MeV energy), down to the diffraction limit of lateral resolution, over a fluence range of $10^7 - 10^{15} \text{ cm}^{-2}$. A furnace operating in high-vacuum (10^{-7} mBar) has been employed to activate negative Silicon-Vacancy (SiV-) centers with a yield in the order of 3%, while room temperature fs-laser activation experiments are underway. The photoluminescence properties of the SiV centers have been studied from 20 to 800 $^{\circ}\text{C}$, including their single-photon emission characteristics. Single-photon emitters have been obtained, exhibiting a short excited-state lifetime (~ 1 ns), a strong zero-phonon transition with a narrow linewidth (~ 1.6 nm) and a very small inhomogeneous broadening (0.015 nm).

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