An ultra wideband-high spatial resolution-compact electric field sensor based on Lab-on-Fiber technology

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Non-intrusive, wide bandwidth and spatial resolution are terms often heard in electric field sensing. Despite of the fact that conventional electromagnetic field probes (EMF) can exhibit notable functional performances, they fail in terms of perturbation of the E-field due to their loaded metallic structure. In addition, even though electro-optical technology offers an alternative, it requires large interaction lenghts which severely limit the sensing performances in terms of bandwidth and spatial resolution. In this tak , I will focus on miniaturizing the interaction volume, photon lifetime and device footprint by taking advantage of the combination of lithium niobate (LN), Lab-on-Fiber technologies and photonic crystals (PhC). I will show you the operation of an all-dielectric E-field sensor whose ultra-compact footprint is inscribed in a 125 μm-diameter circle with an interaction area smaller than 19 μm x 19 μm and light propagation length of 700 nm. This submicrometer length provides outstanding bandwidth flatness, in addition to be promising for frequency detection beyond the THz. Moreover, the minituarization also provides unique features such as spatial resolution under 10 μm and minimal perturbation to the E-field, accompanied by great linearity with respect to the E-field strength.