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Integrated E-field and B-field sensor using electro-optic and magneto-optic materials ANTHONY GARZARELLA, DONG HO WU, Naval Research Lab — In this presentation, we describe an integrated, fiber optic, electro-optic (EO) and magneto-optic (MO) sensor for the detection and measurement of electric and magnetic fields. Conventional sensors such as dipole and loop antennas are metallic-based, thereby perturbing the very fields they measure. Additionally, metallic probes cannot be used high power microwaves, large magnetic fields, or in small cavities. EO sensors (based on the Pockels Effect) and MO sensors (based on the Faraday rotation) are small in size (a few mm^2), have large bandwidths, and detect external electric and magnetic fields optically without the use of metallic components in the sensorhead. In spite of their intrinsic advantages, EO and MO sensors are rarely used in actual field measurement applications and are confined to more research-oriented laboratory applications due to low sensitivity, optical phase noise and other limitations. In this presentation, we describe an integrated EO and MO sensor which overcomes many of these obstacles and has been used in a variety of field tests involving numerous sources of electric and magnetic fields. Experimental data is presented with power levels from tens of milliwatts to several megawatts and frequencies from dc to 10 GHz.

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