



ACS Photonics Cover

ICFO's "Strong Modification of Magnetic Dipole Emission through Diabolo Nanoantennas" highlighted on the cover of August 2015 Issue

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Magnetic dipole transitions in matter, eg. complex molecules, are known to be orders of magnitude weaker than their electric dipole counterparts. In order to amplify the absorption and/or emission of these transitions, it is thus interesting to enhance the optical magnetic field together with the magnetic local density of states around the molecules.

To do this nanophotonic and plasmonic structures are used because they have shown to have the potential of strongly enhancing the optical magnetic fields in the near field, making these nanostructures ideal candidates to control and enhance the emission of magnetic dipole transitions.

In the recent study entitled "Strong Modification of Magnetic Dipole Emission through Diabolo Nanoantennas", published in ACS Photonics, ICFO researchers Mathieu Mivelle and ICREA Professor at ICFO Maria Garcia-Parajo, in collaboration with researchers from the University of Franche-Comte, IBM, and University of Münster, have theoretically investigate the potential of resonant optical nanoantennas based on diabolo and o metal-insulator-metal diabolo configurations to strongly modify the magnetic dipole o emitters. The illustration of this research has had the honor of gracing the cover of th journal?s current issue.

In their study, the team of researchers found that both configurations provide unprecedented 102- to 103--fold enhancement of the total and the radiative decay rates of a magnetic dipole moment. They showed that these two nanoantennas have opposed effects on the quantum yield of the magnetic dipole, translating into different antenna efficiencies.

Furthermore, by using a magnetic dipole moment as a theoretical optical nanosensor, they numerically mapped the behavior of the magnetic local density of states (MLDOS) in the entire plane close to the diabolo nanoantenna and demonstrated the strong confinement and local enhancement of the MLDOS by the nanoantenna.

The results of this work have highlighted the unique ability of optical nanoantennas to control light emission from magnetic dipoles, opening new technological avenues in the magneto-optical domain.