FORWARD AND BACKWARD PHOTONIC ROUTES THOUGH INTEGRATED DEVICES.

Fernando Ramiro-Manzano

Instituto de Tecnología Química CSIC/UPV, Avda. Los Naranjos SN, Valencia, Spain
e-mail: ferraman@gmail.com

The optical microresonator, one of the main building blocks of integrated photonics, when is designed and fabricated for achieving a high Quality factor, usually presents back-reflections due to surface roughness. This signal is typically considered as a spurious effect, but depending on the application could limit the performance and even the functionality of the device.

In some cases, a typical light-transmittance characterisation of a microresonator could reveal the presence of this counter-propagating light in the form of mode split. However, these doublets could be hidden or looked like balanced. Here we will show that the phase measurement permits to faithfully determine or reveal both the presence of the split and the unbalance degree. This valuable information allows for cataloguing the back-coupling and counter-propagating light, showing a richness of phenomenological possibilities. Here we will focus on how to control them. This could open the door to an additional degree of freedom for designing photonic circuits, where the ports of the photonic components change from in or out to duplex (in/out) in a dual signal processing. In particular, this talk will deal with advanced characterization techniques based on interferometry, implications of the time-reversal symmetry in numerical and analytical models, and non-linear optics.