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Observation of Novel Nanostructures by a Modified Leakage Radiation Microscope

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We present an experimental study of the optical behavior of novel nanostructures by using a modification of the leakage radiation microscope (LRM) [1]. This technique has demonstrated that it is possible to quantify the near-field interactions between light and nanostructures with a diffraction-limited system. In particular, we observe the resonance modes in a deep circular cavity and the radiation pattern produced by a nanocoaxial structure. We found, in both cases, that the LRM can resolve the characteristic optical features associated with these nanostructures, particularly the plasmonic drumhead modes that was recently reported by our group [2]. Comparison with images obtained by near-field scanning optical microscopy (NSOM) confirms that our results are consistent and show the predicted physical effects. This modified LRM can be used in a wide range of small-scale optical investigations.

[1] A. Drezet, A. Hohenau, D. Koller, A. Stepanov, H. Ditlbacher, B. Steinberger, F.R. Aussenegg, A. Leitner, J.R. Krenn, *Mat. Sci. and Eng. B* 149, 220 (2008).

[2] F. Ye, M. J. Burns, M. J. Naughton, *Nano Lett.*, 13, 519 (2013).