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Multiply Ionized Plasmas with index of refraction greater than one JORGE FILEVICH, JONATHAN GRAVA, MIKE PURVIS, MARIO C. MARCONI, JORGE ROCCA, NSF ERC for Extreme Ultraviolet Science and Technology, Colorado State University, Fort Collins, Colorado 80523, JAMES DUNN, JOE NILSEN, JIM SCOFIELD, STEPHEN S. MOON, RAYMOND F. SMITH, ROISIN KEENAN, JIM R. HUNTER, Lawrence Livermore National Laboratory, Livermore, California 94550, V.N. SHLYAPTSEV, Department of Applied Science, University of California Davis-Livermore, — We have obtained clear experimental evidence showing that the contribution of bound electrons can dominate the index of refraction in multiply ionized plasmas at soft x-ray wavelengths. We have conducted soft x-ray laser interferometry experiments at 14.7 nm with a Ni-like Pd laser and with a 46.9 nm Ne-like Ar laser that show anomalous fringe shifts in laser-created plasmas from different target materials. Comparison with code simulations shows that the observed anomalous fringe shifts are the result of the contribution of bound electrons of low charge ions to the index of refraction. The results have broad implications, as the bound electrons are shown to affect the index of refraction of many plasmas at soft x-ray wavelengths. Work sponsored by the NNSA-SSAA program through DOE Grant # DE-FG03-02NA00062 and U.S. DOE by the U. of California LLNL through the ILSA, contract No. W-7405-Eng-48.

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