AIP Conf. Proc. / Volume 24 / Issue 1

PREV NEXT

Magneto-optical studies of ferromagnetic metals

AIP Conf. Proc. -- April 1975 -- Volume 24, pp. 190-194
; doi:10.1063/1.30042

Issue Date: April 1975

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Magneto-optic Kerr effect (MOKE) spectroscopy is one of several experimental techniques that can be used to study the electronic structure of ferromagnets. Specifically, MOKE spectra contain information related to the electron spin-polarization (ESP), exchange splitting, widths and shapes of minority and majority spin bands. MOKE spectra are therefore related not only to optical and photoemission results, but also to other experiments which measure ESP. These latter experiments, which include spin-polarized photo-emission and field emission, and spin-dependent tunneling have produced some results which appear to be in conflict with various theoretical prediction. Magneto-optical experiments can be used to study these discrepanices and may be helpful in resolving some of them. Magneto-optical spectroscopy of transition metal and rare earth ferromagnets is discussed. The d-band widths of Fe, Co, and Ni determined from MOKE spectroscopy are wider than corresponding widths measured by photoemission, and the sign of ESP near the Fermi level in Ni is found to be negative as predicted by band theory. Several interesting future applications of MOKE spectroscopy are suggested by these results.

Permalink: http://link.aip.org/link/?APCPCS/24/190/1

PACS

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- YEAR: 1975

PUBLICATION DATA