

Plenary Talk

PV IX Tue 16:30 Audimax 2

Microscopic polarization and magnetization fields: Towards a ‘post modern’ theory — ●JOHN SIPE — Department of Physics, University of Toronto, 60 St. George St., Toronto, ON M5S 1A7 Canada

The response of solids to incident electromagnetic fields is often heuristically formulated in terms of macroscopic polarization and magnetization fields. The ‘modern theory of polarization,’ and its extension

to magnetization, gives this a new level of rigour for time independent and uniform applied fields. We review the philosophy and main results of this strategy, and report on a new approach based on introducing microscopic polarization and magnetization fields. This ‘post-modern’ strategy can be used to address the response to electromagnetic fields varying arbitrarily in space and time. We connect it to earlier work on atoms and molecules, identifying important similarities and differences.