APR11-2011-000294

Abstract for an Invited Paper
for the APR11 Meeting of
the American Physical Society

Physics and the Quest for Hydrocarbons

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This talk contains brief overviews of forecast demand, petroleum geology, petrophysics, formation evaluation, and measurements made while drilling. Several examples show how physics is used to locate and to determine the volume and type of hydrocarbons, the pressure of subsurface fluids, and the formation permeability. Sophisticated instruments built into drill collars measure the subsurface properties at and behind the drill bit. Such measurements include electromagnetic propagation, Compton scattering, neutron scattering, nuclear spectroscopy, and magnetic resonance, among others. The hostile drilling environment (high temperatures, high pressures, and high shock levels) create challenging problems for the physicist and engineer who design such instruments.