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# Abstracts of Papers to Appear in Future Issues

*Symmetry Restoration and the Background Field Method in Gauge Theories.* GRAHAM M. SHORE. Lyman Laboratory of Physics, Harvard University, Cambridge, Massachusetts 02138, AND NEWMAN LABORATORY OF NUCLEAR STUDIES, Cornell University, Ithaca, New York 14853.

Spontaneously broken gauge theories in a constant external electromagnetic field are shown to exhibit a first-order phase transition to a restored symmetry phase when the external field exceeds a certain critical value. The effects of fields characterized by various values of the two Lorentz invariants $\mathcal{F}_1 = \frac{1}{2}(B^2 - E^2)$ and $\mathcal{F}_2 = \mathbf{E} \cdot \mathbf{B}$ are discussed. In a simple $SU(2)$ model the critical field strength is found to be $g_R^2(\mathcal{F}_1)_{\text{crit}} = 0.057\ m_w^4$, $m_w$ being the vector boson mass. A number of theoretical developments in the background field formalism are presented. A new gauge-fixing term, the background field $R$ gauge, is introduced. The configuration space heat kernel method for evaluating functional determinants, extended to allow the use of dimensional regularization, is employed, and it is shown how to perform background field calculations in a gauge specified by an arbitrary parameter $\alpha$. Further applications of these methods are discussed.

*Optical Potential Study of $\Sigma$ Nuclear States.* A. GAL, Brookhaven National Laboratory, Upton, New York 11973; G. TOKER, Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, AND Y. ALEXANDER, Racah Institute of Physics, The Hebrew University, Jerusalem 91904, Israel.

Single-particle energies and widths of $\Sigma$ hypernuclear states are calculated in light systems ($A \leqslant 40$) as energy eigenvalues of the Schrödinger equation for a complex optical potential that fits level shifts and widths of $\Sigma^-$ atoms. The interpretation and significance of $\Sigma$ (normalizable) bound states embedded in the $\Lambda$ hypernuclear (as well as, sometimes, in the $\Sigma$ hypernuclear) continuum are discussed and their properties are studied, primarily in order to identify relatively narrow ($\Gamma \lesssim 10$ MeV) states. The connection between these calculations and the recently observed $\Sigma$ hypernuclear states suggests that bound states embedded in the $\Sigma$ continuum, rather than (nonnormalizable) Gamow resonant states, are produced in $(K^-, \pi)$ nuclear reactions.

*Parity Violation in Electron–Deuteron Scattering. II. Break-up Channels.* W-Y. P. HWANG, E. M. HENLEY, AND GERALD A. MILLER, Institute for Nuclear Theory, Department of Physics, FM-15, University of Washington, Seattle, Washington 98195

Parity violation in electron–deuteron inelastic scattering is described. An impulse approximation, modified to incorporate gauge invariance, is employed. Additional meson-exchange currents are included. Normal-parity and abnormal-parity wave function components are generated numerically with a Reid soft-core potential for the former and a general parity-violating weak potential with adjustable coupling constants for the latter. Numerical results for parity-conserving differential cross sections are in good agreement with existing data. For low n–p excitation energies and medium-energy electrons, we find that parity-violating asymmetries are dominated by contributions from neutral weak currents so that the Weinberg–Salam theory can be tested. For low-energy electrons, 5 MeV $\lesssim E_e \lesssim$ 50 MeV, our results indicate that the asymmetry caused by *nuclear* parity violation is roughly as important as that due to neutral weak currents. The pion–nucleon parity-violating coupling, $f_\pi$, as well as the rho- and omega-