

Research Highlights

Highlights of my research can be found in the following papers.

Spontaneous breaking of gauge symmetries:

- Global conservation laws and massless particles [G.S. Guralnik, C.R. Hagen & T.K.], *Phys. Rev. Letters* **13**, 585–7 (1964) [doi:10.1103/PhysRevLett.13.585]
- Symmetry-breaking in non-Abelian gauge theories, *Phys. Rev.* **155**, 1554–61 (1967) [doi:10.1103/PhysRev.155.1554]
- Englert-Brout-Higgs-Guralnik-Hagen-Kibble mechanism, *Scholarpedia* **4**(1):6441 (2009)

Gravity as a gauge theory:

- Lorentz invariance and the gravitational field, *J. Math. Phys.* **2**, 212–21 (1961)
- Canonical variables for the interacting gravitational and Dirac fields, *J. Math. Phys.* **4**, 1433–37 (1963)
- Gauge theories of gravity and supergravity [T.K. & K.S. Stelle], *Progress in quantum field theory*, ed. H. Ezawa & S. Kamefuchi (Amsterdam: North-Holland, 1986), pp. 57–81 [Festschrift for H. Umezawa]

Symmetry breaking and defects

- Topology of cosmic domains and strings, *J. Phys. A: Math. & Gen.* **9**, 1387–98 (1976) [doi:10.1088/0305-4470/9/8/029]
- Vortex formation in neutron-irradiated superfluid $^3\text{He-B}$ as an analogue of cosmological defect formation [V.M.H. Ruutu, V.B. Eltsov, A.J. Gill, T.K., M. Krusius, Yu.G. Makhlin, B. Plaçais, G.E. Volovik & Wen Xu], *Nature* **382**, 334–6 (1996) [doi:10.1038/382334a0]
- Symmetry breaking and defects, in *Patterns of Symmetry Breaking*, ed. H. Arodz, J. Dziarmaga & W.H. Zurek, NATO Science II, **127**, pp. 3–36 [Proceedings of NATO Advanced Study Institute, Cracow, September 2002],
- Phase transition dynamics in the lab and the universe, *Physics Today* **60**, no. 9 (September 2007), 47–53 [doi:10.1063/1.2784684]

Cosmic strings and superstrings

- Cosmic strings [M.B. Hindmarsh & T.K.], *Reports on Progress in Physics*, **58**, 477–562 (1995) [ArXiv.org://hep-ph/9411342]
- Fundamental cosmic strings [A.-C. Davis and T.K.], *Contemporary Physics*, **46**, 313–322 (2005) [doi:10.1080/00107510500165204]
- Cosmic strings and superstrings [E.J. Copeland & T.K.], *Proc. Roy Soc. A* **466**, 623-657 (2010) [doi:10.1098/rspa.2009.0591]

Other topics

- Kinematics of general scattering processes and the Mandelstam representation, *Phys. Rev.* **117**, 1159–61 (1960)
- Interaction of intense laser beams with electrons [L.S. Brown & T.K.], *Phys. Rev.* **133**, A705–19 (1964) [doi:10.1103/PhysRev.133.A705]
- Geometrization of quantum mechanics, *Commun. math. Phys.* **65**, 189–201 (1979) [doi:10.1007/BF01225149]