
AARON WRIGHT, University of Toronto and Massachusetts Institute of Technology
Penrose Diagrams and the "Renaissance" of General Relativity, 1962–1973

Penrose diagrams manifest the impossible: infinite universes, black holes, even *chains* of infinite universes *connected* by black holes become finite and definite on the page. This was accomplished through the development of ideas from topology within physics. The conceptual shifts engendered by the diagrams and the conformal transformations used to create them produced new ways of understanding mathematical- and physical-concepts. They were invented by Roger Penrose in 1962 in the context of the study of Einstein's theory of gravity, General Relativity. This was during a period of growth and development in the field that has been called the "Renaissance" of General Relativity. In this paper I trace the path of Penrose diagrams through the community of mid-century "relativists." This path highlights a structural feature of this community—the close interrelation of the contexts of research and of pedagogy—that helps explain the occurrence of this "Renaissance." The diagrams are taken to be an exemplar of the role of new "paper tools" in physics. Penrose diagrams are part of a visual tradition of space-time diagrams within physics; they are also part of Penrose's personal tradition of exploring the art and psychology of M. C. Escher-like "impossible objects." My analysis highlights the convergence of new ways of thinking and new ways of seeing in General Relativity's "Renaissance."