Differential Synthetic Geometry:
a Possible Foundation for a Theory of Gravitation

by
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Power may obstruct knowledge for a time but knowledge will prevail.... Even under oppression scholars can take heart with the victorious knowledge ... 'and still it moves!' -- Max von Laue

The scientific incontrovertibility of physics leads directly to the ethical demand for veracity and honesty. And justice is inseparable from truth... Just as the laws of nature work consistently and without exception, in great things and in small, so too people cannot live together without equal justice for all. -- Max Planck

Science makes people reach ... for truth and objectivity; it teaches people to accept reality, with wonder and admiration, not to mention the deep joy and awe that the natural order of things brings to the true scientist. -- Lise Meitner

Dedicated

to

Genuine, Honest Scientists

Curriculum Vitae

The author was born in Salem, Oregon on January 19, 1946. He attended Oregon State University as a Special Student for the 1963-64 academic year. He did his baccalaureate work at the California Institute of Technology from 1964 to 1968 receiving his Bachelor of Science degree (with honor) in the field of Physics in 1968. He attended Montana State University for the Fall of 1973. He came to the University of Rochester in September 1988 with vain hopes of doing post-graduate work.

Acknowledgments

I owe a great deal to three particular people who made this thesis possible. They have my profound thanks.

Tho I have been thinking about this material for a long time I never made significant progress until I took Professor Sanford Segal's course in Non-Euclidean Geometry in the Fall of 1991. It revealed to me the efficacy of the methods of synthetic geometry beyond the high school level. This body of mathematics is, at great loss, neglected in the physics curriculum (and, astoundingly, by mathematicians as well).

Without the advice, help and friendship of Yongli Gao I would not have been able to submit this thesis. I owe him a great deal.

Conrad Plaut was the only person who was willing to seriously look at any of my paper. Otherwise it would have been entirely buried by calculated default. He has been unaccountably generous with his time in serving as thesis advisor. Without his willingness to do so the Physics Department would not have formed of the required thesis committee. He has thereby made possible the submission of this thesis. And his knowledge, advice and help have improved it considerably.

Abstract

An interest in developing a differential version of synthetic geometry is motivated by its potential for gravitational theory, especially a version which might gracefully incorporate spin. This thesis only addresses the needed mathematical foundations; physical applications, if there are any, will have to come later. An axiom set for two dimensions is proposed, some of its consequences explored and, to a certain point, considerable progress is made.

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