

CALIFORNIA INSTITUTE OF TECHNOLOGY

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THEORETICAL ASTROPHYSICS 130-33

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June 21, 1982

Mr. Odylio Denys de Aguiar
Rua Massaguaçu, 130, Cidade Jardim
12200-São José dos Campos - S.P.
Brazil

Dear Mr. de Aguiar:

This replies to your letter of April 15. I do not know of any experimental physics group anywhere in the world which is trying to do serious experiments on the production of gravitational waves by interactions between electromagnetic waves and electrostatic or magneto-static fields. Many theoretical estimates have been made of the strength of such produced gravitational waves and of the prospects to detect them. All correct estimates of which I am aware conclude that it is hopeless to generate detectable waves in this manner. The best estimates I know of are those made by Leonid Grishchuk and his colleagues in Moscow. I do not have precise references, but you might check the names Leonid Grishchuk, Ya. B. Zel'dovich, and Vladimir B. Braginsky in bibliographies of physics publications; the relevant papers were published in the early or mid-1970's.

On the other hand, there are several experimental groups working on the detection of cosmic gravitational waves by their interaction with electromagnetic fields. These groups include our own here at Caltech, the group of Professor Rainer Weiss at MIT, the group of Professor Billing at the Max Planck Institute for Quantum Optics in Munich, Germany, the group of Ronald Drever at Glasgow University in Glasgow, Scotland, and a group in Novosibirsk, Russia. All of these groups are using laser interferometry to attempt the detection of gravitational waves. There are also ideas floating around for detection of gravitational waves by their interaction with microwave radiation in microwave cavities. I enclose one reference, by a colleague of mine, on this subject.

So far as work for the Ph.D. is concerned, I would suggest that you consider the following experimental gravity research groups: Professor Vladimir B. Braginsky, Physics Department, Moscow State University, Moscow 117234, U.S.S.R. (he is using microwave-cavity transducers to monitor the motion of a sapphire-crystal bar gravitational-wave detector); Professor Rainer Weiss, Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139 (he is using laser interferometry to monitor the motions of freely swinging, widely separated masses, for gravitational-wave detection); Professor Ronald W. P. Drever, Gravity Physics 130-33, California Institute of Technology, Pasadena, California 91125 (laser

Mr. Odylio Denys de Aguiar
June 21, 1982
Page Two

interferometry as above); Professor Ronald W. P. Drever, Department of Natural Philosophy, Glasgow University, Glasgow, G12 8QQ, Scotland (laser interferometry as above); Professor H. Billing, Max-Planck-Institut für Astrophysik, D-8046 Garching, F. R. Germany (laser interferometry as above); Professor David Douglass, Department of Physics and Astronomy, University of Rochester, Rochester, New York 14627 (bar detector for gravitational waves, monitored by SQUID transducer); Professor Joseph Weber, Physics Program, University of Maryland, College Park, Maryland 20742 (bar detector); Professor William Hamilton, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, Louisiana 70803 (bar detector).

I hope that this information is of some help to you.

Sincerely,

Kip S. Thorne (by jba)
Kip S. Thorne
Professor of Theoretical Physics

KST:jba
Enclosure

Dictated by Prof. Thorne just before a one-month trip to Europe; typed and signed in his absence by JoAnn Boyd Anderson.