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Director

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FOREWORD

This report summarizes the research performed in 2000 in the Physics Division of Argonne National Laboratory. The Division's programs include operation of ATLAS as a national user facility, nuclear structure and reaction research, nuclear theory and medium energy physics research, and accelerator research and development. As the Nuclear Science Advisory Committee and the nuclear science community create a new long range plan for the field in 2001, it is clear that the research of the Division is closely aligned with and continues to help define the national goals of our field.

The NSAC 2001 Long Range Plan recommends as the highest priority for major new construction the Rare Isotope Accelerator (RIA), a bold step forward for nuclear structure and nuclear astrophysics. The accelerator R&D in the Physics Division has made major contributions to almost all aspects of the RIA design concept and the community was convinced that this project is ready to move forward.

2000 saw the end of the first Gammasphere epoch at ATLAS, One hundred Gammasphere experiments were completed between January 1998 and March 2000, 60% of which used the Fragment Mass Analyzer to provide mass identification in the reaction. The experimental program at ATLAS then shifted to other important research avenues including proton radioactivity, mass measurements with the Canadian Penning Trap and measurements of high energy gamma-rays in nuclear reactions with the MSU/ORNL/Texas A&M BaF_2 array. ATLAS provided 5460 beam-research hours for user experiments and maintained an operational reliability of 95%. Radioactive beams accounted for 7% of the beam time. ATLAS also provided a crucial test of a key RIA concept, the ability to accelerate multiple charge states in a superconducting heavy-ion linac. This new capability was immediately used to increase the performance for a scheduled experiment.

The medium energy program continued to make strides in examining how the quark-gluon structure of matter impacts the structure of nuclei and extended the exquisite sensitivity of the Atom-Trap-Trace-Analysis technique to new species and applications.

All of this progress was built on advances in nuclear theory, which the Division pursues at the quark, hadron, and nuclear collective degrees of freedom levels.

These are just a few of the highlights in the Division's research program. The results reflect the talents and dedication of the Physics Division staff and the visitors, guests and students who bring so much to the research.

Donald Geesaman, Director, Physics Division

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