

Contents

Portrait of Edward Teller	v
Motto by Edward Teller	vii
Foreword by Edward Michael Campbell	1
Introductory Remarks to the “Edward Teller Lectures” <i>H. Hora and G. H. Miley</i>	3
Occasional Addresses by Edward Teller at Conferences of Laser Interaction and Related Plasma Phenomena (LIRPP)	25
Futurology of High Intensity Lasers (LIRPP Vol. 3A)	29
Lecture in Connection with the Edward Teller Medal Award (LIRPP Vol. 10)	39
Photo of the First Recipients of the Edward Teller Medal in 1991	43
Photos from the Edward Teller Medal Celebration in 1997	44
Photo with Participants of the LIRPP No. 12 Conference, 1995	45
Photo with Edward Teller Medalists at IFSA01, Kyoto, 2001	46
Keynote Address: The Edward Teller Lecture (LIRPP Vol. 11)	49
Keynote Address: Dr. Edward Teller (LIRPP Vol. 12)	57
Teller Award Presentation and Keynote Address (LIRPP Vol. 13)	61
Laudations of Awardees 1991–1995 (LIRPP Vol. 13)	71
Laudations of Awardees 1999–2003	77
Lectures Presented by the Edward Teller Medalists	81
Edward Teller Medal: Acceptance Remarks (LIRPP Vol. 10) <i>J. H. Nuckolls</i>	85
Comments on the History and Prospects for Inertial Confinement Fusion (LIRPP Vol. 10) <i>N. G. Basov</i>	89
Laser Fusion Research in 30 Years: Lecture of Edward Teller Awardee (LIRPP Vol. 10) <i>C. Yamanaka</i>	95
New Basic Physics Derived from Laser Plasma Interaction (LIRPP Vol. 10) <i>H. Hora</i>	103

Acceptance of the Edward Teller Medal (LIRPP Vol. 11) <i>R. Dautray</i>	117
The Edward Teller Medal Lecture: The Evolution Toward Indirect Drive and Two Decades of Progress Toward ICF Ignition and Burn (LIRPP Vol. 11) <i>J. D. Lindl</i>	121
Views on Inertial Fusion Energy Development (LIRPP Vol. 11) <i>S. Nakai</i>	151
Path to Ignition: US Indirect Target Physics (LIRPP Vol. 12) <i>M. Cray and E. M. Campbell</i>	157
Teller Award Acceptance Speech (LIRPP Vol. 12) <i>R. L. McCrory</i>	167
1995 Edward Teller Lecture: Patience and Optimism (LIRPP Vol. 12) <i>G. H. Miley</i>	179
Teller Award Acceptance Speech (LIRPP Vol. 12) <i>G. A. Kirillov</i>	199
The Edward Teller Medal Lecture: High Intensity Lasers and the Road to Ignition (LIRPP Vol. 13) <i>M. H. Key</i>	203
ICF Related Research at MPQ (LIRPP Vol. 13) <i>J. Meyer-ter-Vehn</i>	215
The Long Way Towards Inertial Fusion Energy (LIRPP Vol. 13) <i>G. Velarde</i>	223
Monte Carlo Methods in ICF (LIRPP Vol. 13) <i>G. B. Zimmerman</i>	231
Scaling Laws of Nonlinear Rayleigh–Taylor and Richtmyer–Meshkov Instabilities in Two and Three Dimensions (IFSA 1999) <i>D. Shvarts (with co-authors)</i>	253
Design of Ignition Targets for the National Ignition Facility (IFSA 1999) <i>S. W. Haan (with co-authors)</i>	263
A Survey of Studies on Ignition and Burn of Inertially Confined Fuels (IFSA 2001) <i>S. Atzeni</i>	271

Teller Medal Lecture IFSA 2001: Problems and Solutions in the Design and Analysis of Early Laser Driven High Energy Density and ICF Target Physics Experiments (IFSA 2001) <i>M. D. Rosen</i>	281
Prospects for High-Gain, High Yield NIF Targets Driven by 2ω (Green) Light <i>L. J. Suter (with co-authors)</i>	293
Hydrodynamic Instability, Integrated Code, Laboratory Astrophysics and Astrophysics <i>H. Takabe</i>	313
30 Years Laser Interaction and Related Plasma Phenomena (LIRPP Vol. 13) <i>H. Hora</i>	337
Laudations of Awardees 2005–2015	353
On the Path to Fusion Energy <i>M. Tabak</i>	363
The Role of Experimental Science in ICF – Examples from X-Ray Diagnostics and Targets <i>J. D.ilkenny</i>	381
Impact of Fast Ignition on Laser Fusion Energy Development <i>K. Mima</i>	391
The Early Years of Indirect Drive Development for High Energy Density Physics Experiments at AWE <i>B. R. Thomas</i>	399
Progress in Cryogenic Target Implosions on OMEGA <i>R. Betti (with co-authors)</i>	413
Ignition and Inertial Confinement Fusion at The National Ignition Facility <i>E. I. Moses</i>	421
Effect of the Laser Wavelength: A Long Story of Laser-Plasma Interaction Physics for Inertial Confinement Fusion <i>C. Labaune</i>	429
Experiments in ICF, Materials Science, and Astrophysics <i>B. A. Remington</i>	439
Alternative Approaches to High Energy Density Fusion <i>J. Hammer</i>	449

Direct-Drive Implosion Physics: Results from OMEGA and the National Ignition Facility <i>R. Petrasso (with co-authors)</i>	457
Studies of High Energy Density Physics and Laboratory Astrophysics Driven by Intense Lasers <i>J. Zhang</i>	465
2015 Award to Academician Jie Zhang	471
A Pathway to Laser Fusion Energy in Japan <i>H. Azechi</i>	475
Epilogue	481
Author Index	483
Subject Index	491
Acknowledgement	497

Foreword by Edward Michael Campbell

Vice-President, General Atomics, San Diego, CA

The Edward Teller medal has evolved into one of the most prestigious awards that recognizes the outstanding contributions to the field of inertial confinement fusion and high energy density science. It is appropriate that this international award be named after Teller, who with extraordinary vision and scientific insight, anticipated and then played a major role in the creation of this field.

This book - following an introduction by Professors Hora and Miley - presents the Teller winners and a sampling of their acceptance remarks. The introduction briefly summarizes the enormous and prophetic contributions of Teller and describes the history and diverse approaches to achieving ignition and gain in Inertial Confinement Fusion (ICF). It is very clear that scientific and technical innovation over the past 40 years gives confidence in the ultimate success of the ICF concept and with construction of megajoule class facilities in the United States and France, the laboratory demonstration of fusion ignition and net gain will take place within a decade. This result, analogous to Fermi's controlled fission demonstration under the squash courts in Chicago, will catalyze fusion energy development worldwide.

The Teller Award winners and their lectures provide ample evidence of the quality of researchers, and of the programs and richness of the field. They give a historical perspective and this summarizes outstanding contributions to laser-plasma coupling physics, energy transport, hydrodynamics and implosions, laser technology, numerical simulation and target design, and x-ray lasers to name only a subset.

The Teller Award Ceremony has recently become a much anticipated event at the Inertial Fusion Science and Applications Conferences. This international conference has now become the leading meeting where researchers of all the various branches and applications of Inertial Fusion come together to share results. Edward Teller would be both surprised and honored with the outstanding work and the international flavor of this meeting. He would be justifiably proud of the field of which he has fathered and of the recipients of the award named for him.