Dr. Mahadeva Srinivasan
Research Pioneer in the LENR Field

LENR Workshop In Memory of Dr. M. Srinivasan

Thomas W. Grimshaw, Ph.D.

LENRGY, LLC

January 2021

Srinivasan LENR Research Documentation Project

- Conducted 2018 to 2020
- Early participant in “LENR Research Documentation Initiative“
- LRDI began at ICCF-21: Poster on Dr. Edmund Storms‘ LENR Research Documentation Project (pilot)
- Initiated with conversation with Srini at ICCF-21 in Colorado

“Chino” Srinivasan with Martin Fleischmann (Probably at ICCF-16, Chennai, India, 2011)

Components of the Srinivasan LRDP

- Research autobiography: Phases I to VI
- Three interviews
- LENR publications and reports
- Related LENR documents
- Project Reports
  - Volume 1, Report
  - Volume 2, Copies of Publications
- Experiment Data and Notebooks (not included)

DOCUMENTATION OF DR. MAHADEVA SRINIVASAN'S COLD FUSION RESEARCH

A PROJECT OF THE LENR RESEARCH DOCUMENTATION INITIATIVE

Volume 1. Third Draft Report

Mahadeva Srinivasan, Ph.D., Associate Director, Physics Group (Retired)
Bhabha Atomic Research Center, Mumbai, Maharashtra, India

Thomas W. Grimshaw, Ph.D., Research Affiliate, Energy Institute
The University of Texas at Austin, USA

June 12, 2020

SLRDP Report, Volume 1

Six Phases of Dr. Srinivasan's LENR Work

- As identified by himself
- Phase I. 1958 to 1989
- Phase II. March 1989 to February 1997
- Phase III. March 1997 to November 2007
- Phase IV. 2008 to 2011
- Phase V. 2011 to 2016
- Phase VI. 2014 to 2018
- Provided to the Project in text form by Srini

Phase I. 1958 to 1989
Pre-Cold Fusion Era

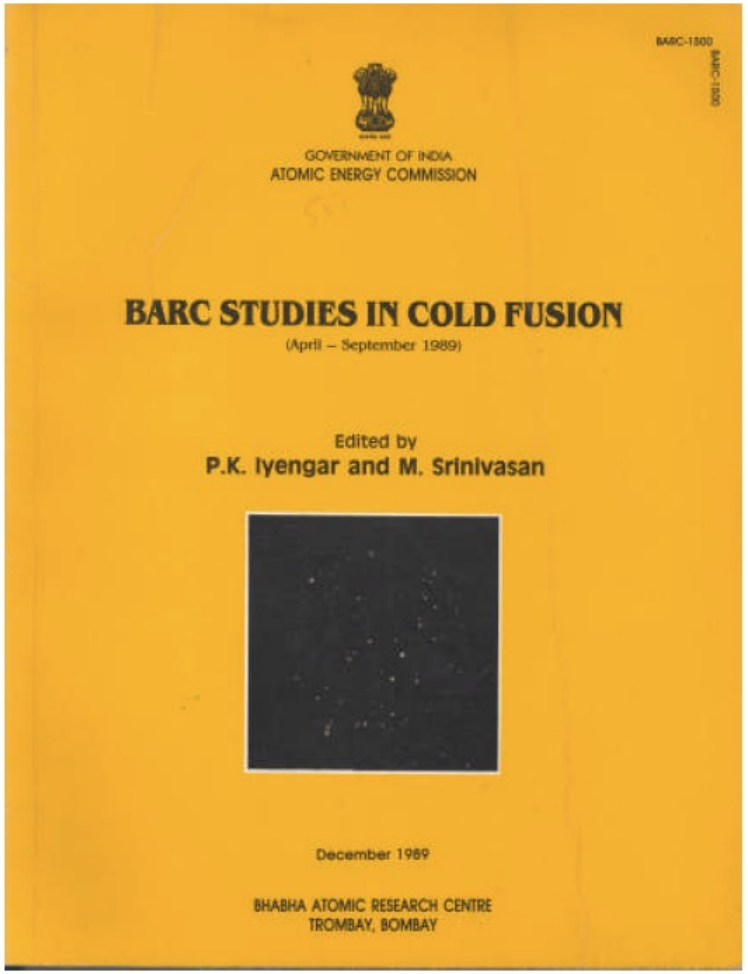
- B. Sc. (Physics), University of Madras (1955)
- B. Sc. (Technology), University of Madras (1957)
- Employed at Bhabba Atomic Research Center (BARC) from 1957 to 1997
- M. Sc. (Physics), Research, University of Bombay (1966)
- Made contributions in both fission and fusion research
- Received prestigious D. Sc. (physics) degree from Bombay University (1984)
- Developed “Trombay Criticality Formula”

Phase II. 3/1989 to 2/1997
Cold Fusion Era Prior to Retirement

- In March 1989 was “in the right place at the right time”
- Head of BARC Neutron Physics Division
- Several active fission and fusion research projects underway
- Developed world’s largest LENR effort at the time (1989-90)
- 12 groups under the BARC Director, Dr. P.J. Iyengar
- First to report branching ratio anomaly (1 million rather than 1)
- LENR research discouraged under new BARC Director in 1991
- Continued LENR research in marginalized conditions until 1997 retirement
- Edited BARC-1500 Report

BARC 1989 Cold Fusion Report

- Edited by Iyengar and Srinivasan
- 19 papers, 37 authors
- Three Parts
  - A. Electrolytic Cell Experiments
  - B. D2 Gas Loading Experiments
  - C. Theoretical Papers
- Reference
  - BARC Studies In Cold Fusion, BARC-1500. 1989, Government of India, Atomic Energy Commission, Bombay.



BARC-1500

Phase III. 3/1997 to 11/2007
"Silent Decade" Following Retirement

- LENR research at BARC ended after Srini's retirement
- Antagonistic BARC Director subsequently elevated to India's Principal Scientific Advisor position
  - Held that position for 20 years
  - Very little opportunity for LENR research in India
- Srini maintained LENR contacts
- Continued attending International Conferences on Cold Fusion (ICCFs)

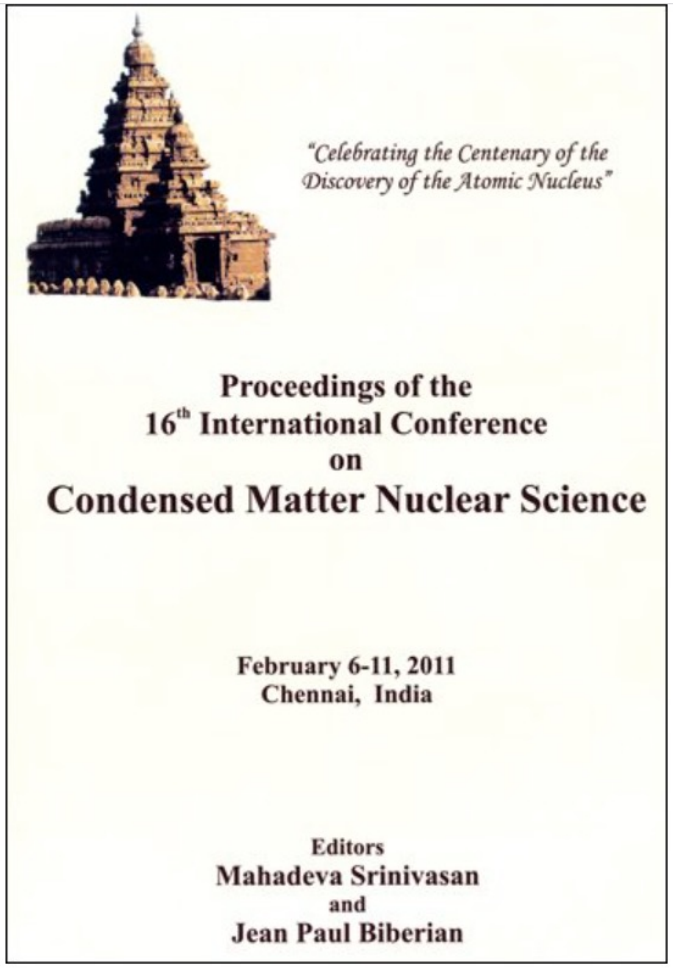
Phase IV. 2008 to 2011
Fresh Attempts to Revive CF/LENR Research in India

- Initiated by LENR optimism at ICCF-13, Solchi, Russia
- Began with one-day brainstorming session in 2008: "Energy Concepts of the 21st Century"
- Organized and led ICCF-16, Chennai, February 2011
  - Co-sponsor, Dr. Krishnan, former Head of Indira Gandhi Center for Atomic Research
  - One pre-conference and two post-conference meetings
- Edited the ICCF-16 conference proceedings

ICCF-16 Proceedings, 2011
Topical Index

- Overview
- Gas Loading
- Electrolysis
- Theory
- Nuclear Particle Measurement
- Transmutation and Hotspots
- Materials
- Engineering & Technology

- 67 Papers



ICCF-16 Proceedings

Phase V. 2011 to 2016

Emergence of the Ni-H based Rossi Reactor and Its Impact

- Rossi January 2011 demonstration came just before ICCF-16
- Srini‘s interest in nickel-hydrogen LENR experiments extended back to 1991 (Randell Mills)
- Sini's interest fueled by several events
  - October 2011 1-mW reactor test
  - Validation indicated by “Lugano” test
  - Mats Lewans’ “Impossible Invention” book
  - Parkhamov verification in Russia
- Lobbied with Indian corporations to manufacture LENR reactors
- Deeply disappointed in outcome of 1-year test with Industrial Heat
- **“Information in the public domain since then does give the impression that Rossi had taken recourse to fraudulent means to try to cheat Industrial Heat during the year-long test”**
- Served as editor of *Current Science Journal* special section on LENR

Current Science Journal (of India)

- Special Section: Low Energy Nuclear Reactions
- Edited by Srinivasan and Muehlenberg
- Vol. 108, No. 4
- Published February 25, 2015
- 35 papers on cold fusion
- Senior figures in LENR field

Phase VI. 2014 to 2018
Appeal to the Politicians in Power for Intervention and LENR (Support)

- Organized LENR session in 2014 conference on materials aspects of Nb-Ta alloys in particle accelerators
- Set up to meeting with Indian Prime Minister in 2014 (PM was a “no-show”)
- Similar (successful) meeting in 2014 with Minister for Power
- Funding received for brainstorming session at National Institute of Advanced Studies (Bangalore)
- Coordinated funding for four LENR research groups
  - IIT Kanpur
  - IIT Bombay
  - sVayasa Bangalore
  - BARC, Mumbai

Interview with Dr. Srinivasan in September 2019

- ICCF-22, Assisi, Italy
- Covers Phases I, II and III
- Recorded on iPhone, transcribed by Rev.com
- Extensively reviewed and edited by Srini
- Included in the SLRDP project report (Volume 1)
- Two previous interviews also included

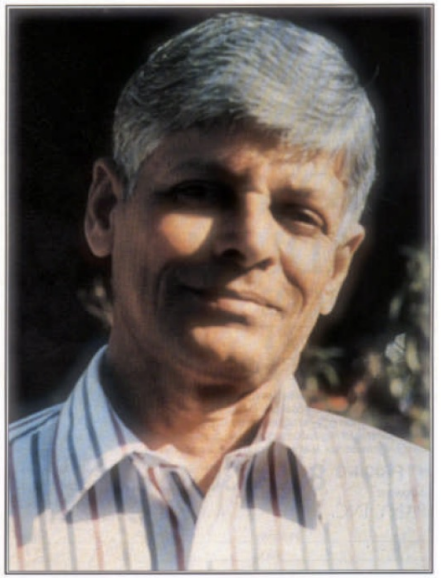
Two Earlier Interviews Included in the Project

- 1994, Russ George

  "The cold fusion phenomenon is real". An interview with Dr. Mahadeva Srinivasan conducted by Russ George. Cold Fusion Magazine, Issue #2, 1994

- 2011, Marianne Macy

  ICCF16 in India: A Historic Perspective. Infinite Energy, Issue 95 (January/February, 2011)



Dr. Srinivasan in 1994

Highlights of the 2019 Interview

- Head of BARC Neutron Physics Division at time of March 1989 announcement
- ***"Three-Stage Nuclear Power Program" (fission)***
- Initial interest was in LENR as source of neutrons (as well as nuclear reactions reaction)
- BARC Director, Dr. P.K. Iyengar, encouraged LENR research
- ***Srini was the unofficial LENR coordinator for Dr. Iyengar***
- About 12 teams in several BARC Divisions engaged in the research

Dr. Srinivasan at ICCF-22

Highlights of the 2019 Interview (2)

- ***Initial electrolytic cell work with large Milton Roy device for producing pure hydrogen***
- Observed bursts of neutron emission
- Did pioneering work in statistical analysis of emissions
- First observation of anomalous neutron to tritium ratio (1,000,000 rather than 1)
- ***Realized early that neutron emission and tritium production was a LENR "side show" (signature only)***
- Director Iyengar was promoted out of the BARC in 1991
- New Director did not support LENR research
- After 1991, Srini research was not funded, but nevertheless continued until his 1997 retirement

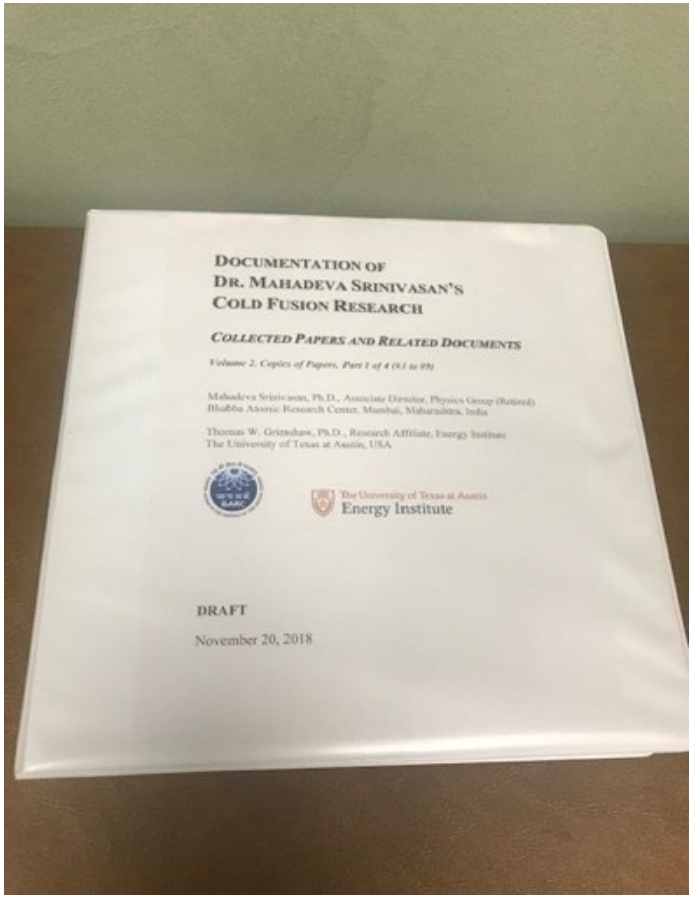
Highlights of the 2019 Interview (3)

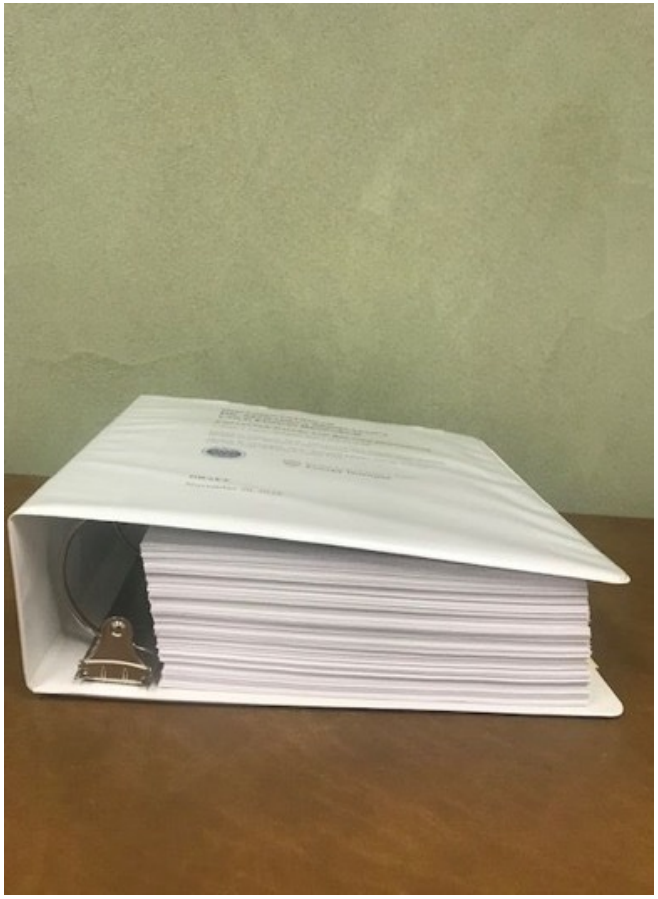
- ***Developed autoradiography and discovered localized "spots" of LENR (indicated by tritium decay)***
- Utilized titanium rather than palladium in different experimental setups
- Because of Randell Mills, became interested in nickel-hydrogen LENR research
- Advantage of nickel and hydrogen: less expensive than palladium and heavy water
- Initial results indicated excess heat, but was found instead to be recombination of hydrogen and oxygen (subsequent research at SRI)
- Subsequently used tritium production as signature and confirmed LENR in nickel-hydrogen experiments
- ***Postulated LENR localization in space (nuclear active spots) and in time (bursts of neutron emissions)***
- LENR research at BARC discontinued after Srini's 1997 retirement

Dr. Srinivasan's LENR Publications and Reports

- Approximately 45 incorporated in Project
- Mostly provided by Srini by email and Dropbox upload
- Also collected from Jed Rothwell's LENR-CANR.org library website
- Listed in Volume 1 Main Report
- Copies included in Volume 2

Collection of Srinivasan's 45 LENR Papers





Other References to Dr. Srinivasan's LENR Work

- Eugene Mallove, "Fire from Ice"
- John Huizenga, "Scientific Fiasco"
- Rothwell Memo: Possible CNN interview
- Russian Magazine "Est Idea" – Article on LENR research at BARC
- Documents for BARC Management
  - "Whither Cold Fusion?", 1991
  - "Paradigm Shifts Which Can Drastically Affect Our Extrapolated Projections", 1995

Project Reports

- Volume 1, ver. 3, 6/20
  - Srinivasan, M., and T. Grimshaw, 2020. Documentation of Dr. Mahadeva Srinivasan's Cold Fusion Research. Third Draft Report, Volume 1. LENRGY, LLC. June 12. 118 p.
- Volume 1, ver. 2, 12/18
  - Srinivasan, M., and T. Grimshaw, 2018. Documentation of Dr. Mahadeva Srinivasan's Cold Fusion Research: Collected Papers and Related Documents. Volume 1, Second Draft Report. Energy Institute, The University of Texas at Austin. December 11. 96 p.
- Volume 1, ver. 1, 11/18
  - Srinivasan, M., and T. Grimshaw, 2018. Documentation of Dr. Mahadeva Srinivasan's Cold Fusion Research: Collected Papers and Related Documents. Volume 1, Draft Report. Energy Institute, The University of Texas at Austin. November 19. 38 p.
- Volume 2, 11/18
  - Publications: Srinivasan, M., and T. Grimshaw, 2018. Documentation of Dr. Mahadeva Srinivasan's Cold Fusion Research: Collected Papers and Related Documents. Volume 2, Copies of Papers, Draft. Energy Institute, The University of Texas at Austin. November 20. 661 p.

Future Project Opportunities
Identified in Report

- Expand interview for Phases IV to VI
- Interview research collaborators (at BARC and elsewhere)
- Develop more detailed research timeline
- Obtain experimental data and notebooks?

- Identified and included, but not accomplished

BARC Accomplishments – According to Dr. Srinivasan

- Neutron to Tritium Ratio Anomaly
  - BARC groups were the first to observe and publish the *neutron to tritium ratio anomaly*. It has been however speculated that neutron emission is possibly a secondary phenomenon wherein energetic tritons released in a primary d-d fusion event knocks off neutrons from the surrounding deuteride matrix.
- Statistical Analysis of Neutron Emission
  - Our group was the first and possibly only group to have carried out a *statistical analysis of neutron emission*, leading to the conclusion that neutron production is not Poisson in nature but rather occurs in bunches of 10 or even as much as 100 neutrons in a single sharp burst.
- Autoradiography: Localized Tritium Emission
  - BARC groups were the first to use *autoradiography* as a powerful investigative tool. It *has revealed the highly localized nature of tritium* production sites on the surface of the host metal samples.

Summary

A Sterling Career in an Essential Field for the Future of Humankind

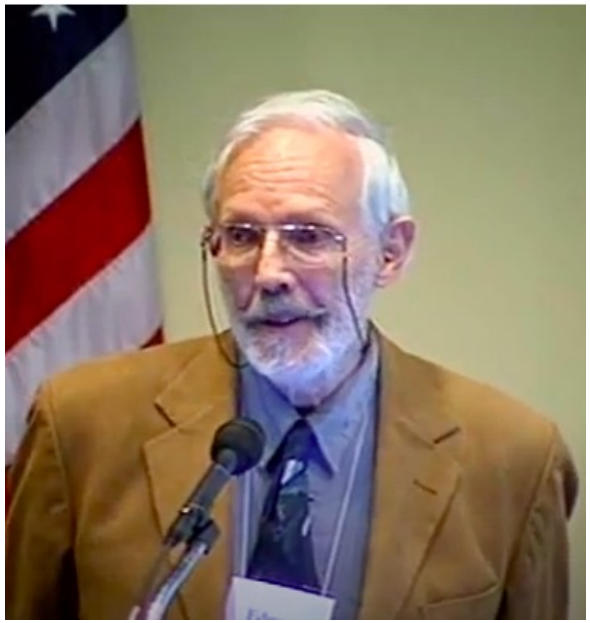
- Research pioneer in the LENR field
- One of the earliest contributors
- Led one of the largest initial research efforts (at BARC)
- Prepared many publications and other documents
- Was responsible for a number of LENR advances
- Became an international presence in the field
- Personable and easy to work with

LENR Research Documentation Initiative

- LENR rejected by mainstream science within a year after 1989
- Pariah science: few new researchers
- Long-term researchers now leaving the field
- Risk of loss of research record
- Tragedy for LENR field – and for humanity
- Objective is to mitigate loss of research records

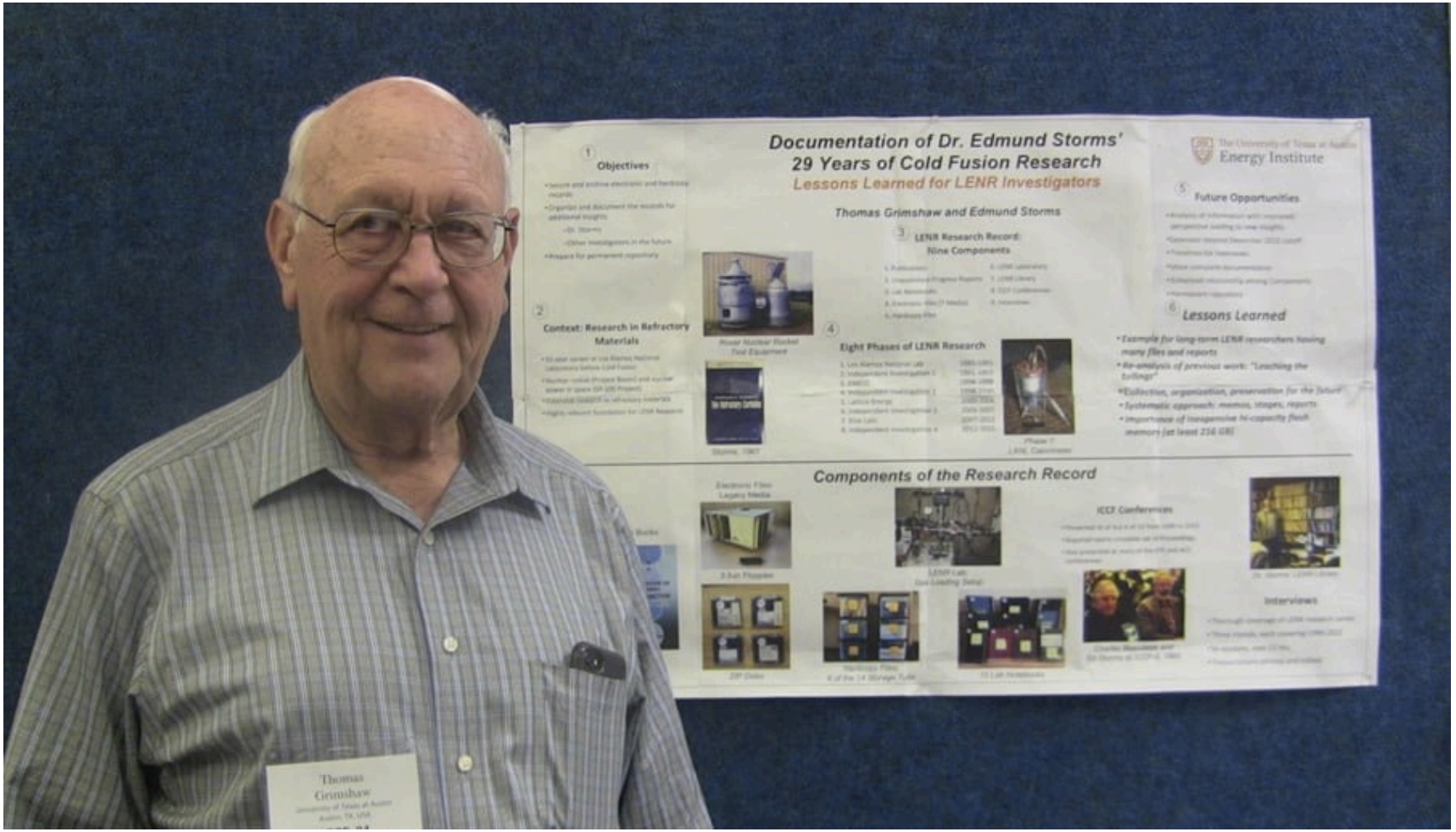
Overview of the LRDI

- Began with Pilot Project with Dr. Edmund Storms
  - Los Alamos National Laboratory (retired)
  - Preparata Medal, 2005
  - 8 components
  - 3 sets of interviews
  - Research phases: LANL, ENECO, Lattice Energy, KivaLab
  - Reports: Stage 1, 2, 3; Summary
  - Poster at ICCF-21, June 2108
- Earliest Participants
  - Dr. Tom Claytor and Dr. Malcolm Fowler, Los Alamos National Laboratory
  - Dr. Dennis Pease, Former SKINR, Univ. of Missouri
  - ***Dr. Mahadeva Srinivasan, Retired from BARC***
  - Dr. David Nagel, The George Washington University



Ed Storms at ICCF-19, 2013

ICCF-21 Poster



Documentation of Dr. Edmund Storms' 29 Years of Cold Fusion Research

Overview of the LRDI (2)

- Described in Infinite Energy #150, March/April 2020

  Documenting Cold Fusion Research: Preserving a Vital Asset for Humankind
- Now includes 26 Participants
- 40 site visits made
- Includes 33 reports, including 1 to 3 Project stages
- Performed initially at The University of Texas at Austin
- Now by LENRGY, LLC
- Affected by COVID-19; future plans in preparation

LRDI Methods

- Information collection, organization, documentation, preservation
- Foundational approach developed in pilot project
- Customized for each researcher
- Begin with professional biography
- Memos for each Component
- Interviews of participants
- On site visits highly preferable
- Research phases (timeline) defined
- Project reports based on interviews and collection of memos

Thanks to the Anthropocene Institute for Supporting the LRDI!

Questions?
(Later)

Thomas W. Grimshaw, Ph.D.
thomaswgrimshaw@gmail.com
+1.512.784.1078

www.lenrgyllc.com