

Activities

Nuclear Astrophysics Data

- Evaluation of Reactions critical for Stellar Explosions
- Development of a Computational Infrastructure for Nuclear Astrophysics Data

Presentation

Thursday Morning

Nuclear Structure Data

- Actinide A-chain Evaluations
- Nuclear Structure Database Development - linking Radware and ENSDF

Long-Term Planning

- **Mentoring in Nuclear Information Technology (MINIT) Initiative**

Presentation

Friday Morning

Personnel

Nuclear Astrophysics Data

- Michael Smith Staff Evaluations
- Jeff Blackmon Staff Evaluations
- Caroline Nesaraja Postdoc Evaluations
- Zhanwen Ma Grad Student Evaluations
- Nengchuan Shu Collaborator Evaluations
- Andy Chae Grad Student Programming
- Eric Lingerfelt Subcontractor Programming
- Jason Scott Subcontractor Programming
- Richard Meyer Consultant Program Development

Nuclear Structure Data

- Murray Martin Subcontractor Evaluations
- David Radford Staff Databases

Yurdanur Akovali

1932 - 2004

Tragically passed away in April, 2004

Physics Division Staff Member 1967 - 2001

Head of ORNL Nuclear Data Project 1999 - 2001

Retired 2001, continued to work part time in ORNL
Nuclear Data Project



Internationally respected expert on nuclear structure data

Specialized in A-chain evaluations of actinide nuclei, with
hundreds of ENSDF evaluations and reviews

Also promoted horizontal evaluations

Was arranging to train a new evaluator from India in Spring 2004

Messages of shock and sympathy from scientists around the world

Yurdanur Akovali

1932 - 2004

Memorials

- **Memorial Forest in Istanbul**

- Contributions may be made in Yurdanur's name for **new plantings**
- Sponsor: The Foundation for Protection and Promotion of the Environmental and Cultural Heritage (CEKUL in Turkish)
- Originally developed for Yurdanur's Mother
- Contact www.cekulvakfi.org.tr/pages/english.asp

- **Website [www . yurdanurakovali . com](http://www.yurdanurakovali.com)**

- Established by her family in Turkey, will be online soon
- Request for stories, anecdotes, pictures, and other rememberances
- Contact: **Aysel Eksi at [Avsel @ yurdanurakovali.com](mailto:Avsel@yurdanurakovali.com)**

- **Memorial service:** in accordance with her wishes, no services were performed locally, and Yurdanur was laid to rest in Ankara, Turkey with her mother

- Survived by daughter Rosanna Grazzini (Atlanta, Georgia) & Brother Guneri Akovali (Turkey)



Actinide Evaluations

Murray Martin has rejoined the ORNL Nuclear Data Project

**Ensures that ORNL will continue its long history of
excellence in Structure Evaluations**

Responsibility: Actinide Evaluations A = 241 - 249
(9 A-chains)

Progress FY04

Yurdanur: A = 243 (in review)

A = 247 (published)

Murray: A = 241 (in progress)

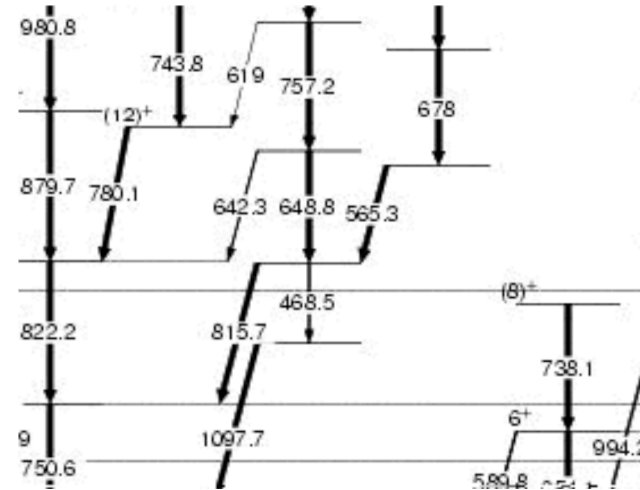
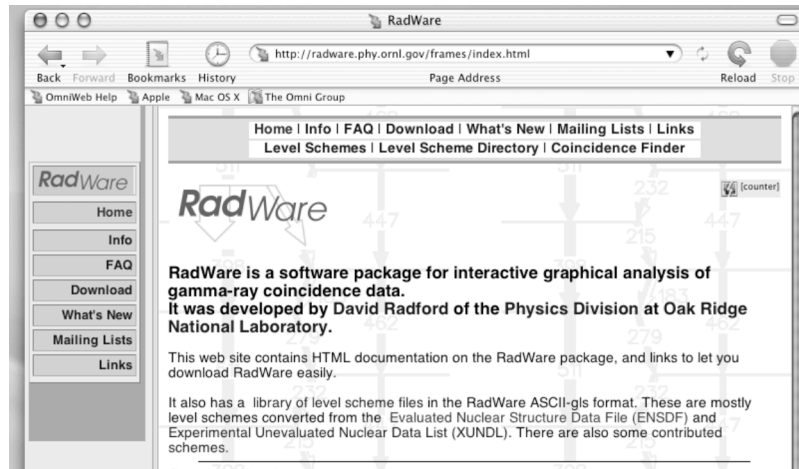
A = 208 (in progress, previous commitment)

Near Future Plans

A = 241 - 249

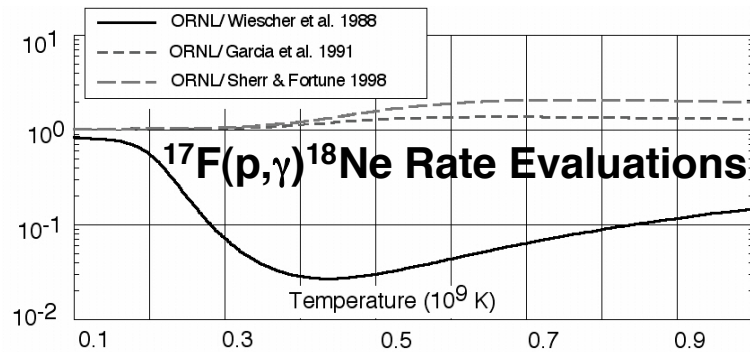
Nuclear Structure Databases: ENSDF and RADWARE

D. Radford



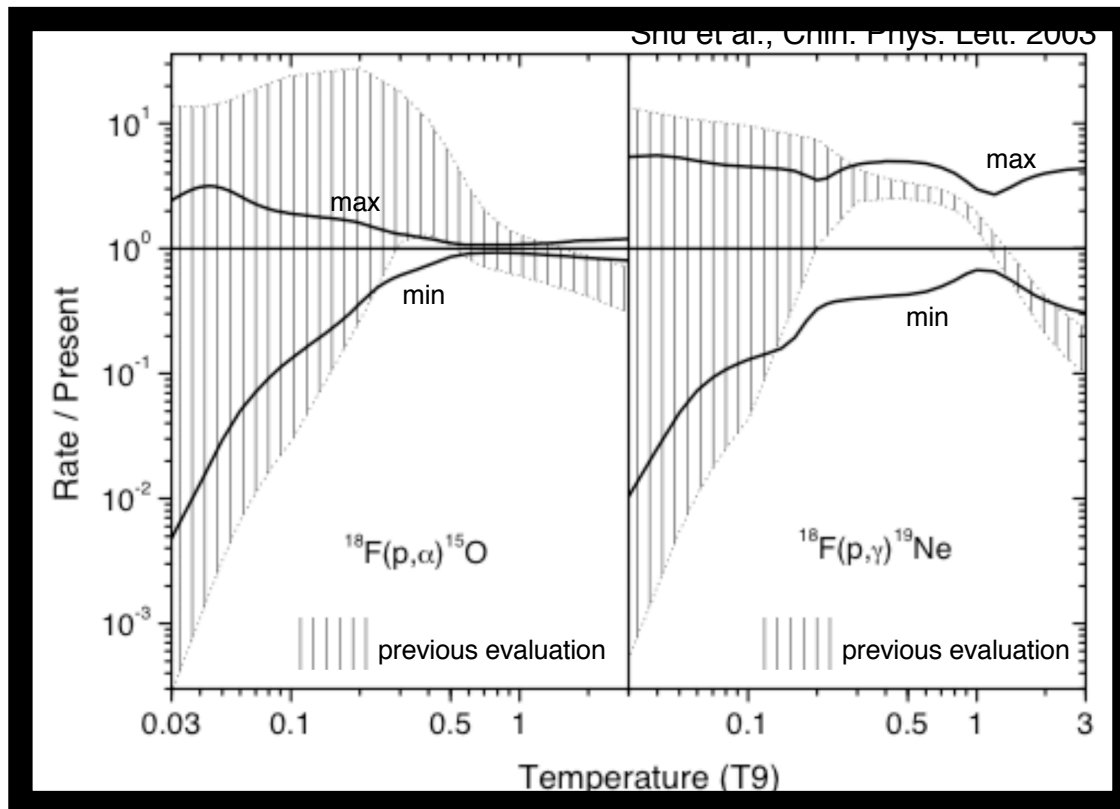
- ENSDF at NNDC: World's Best Nuclear Structure **Data Base**
- RADWARE: World's Best **Data Analysis Tool** in High Spin Nuclear Structure Physics
- **Combine** by converting ENSDF & XUNDL files into RADWARE format
radware.phy.ornl.gov
- Users can **display & manipulate datasets**, incorporate ENSDF information into ongoing analyses of experimental data, perform advance searches (coincidence gamma rays), generate high quality output
- Current plans are to **maintain** the website with regular ENSDF uploads

nuclear astro data evaluations at ORNL



- Evaluations of reactions related to HRIBF Measurements

- $^{14}\text{O}(\alpha,p)^{17}\text{F}$ & $^{17}\text{F}(p,\gamma)^{18}\text{Ne}$
 - novae & X-ray bursts



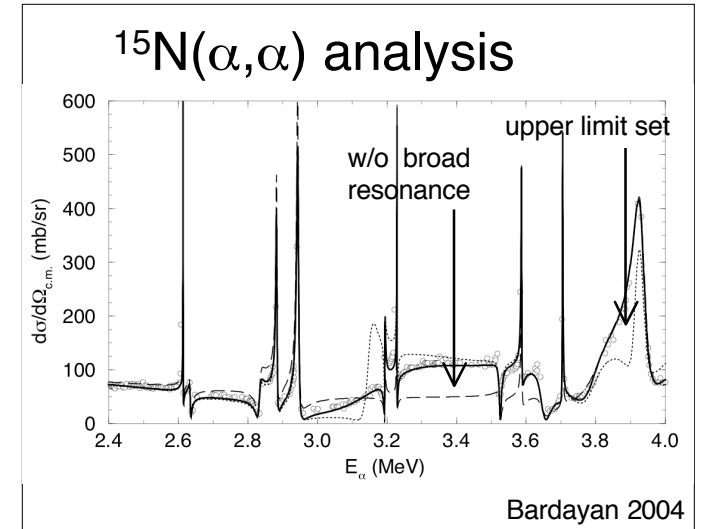
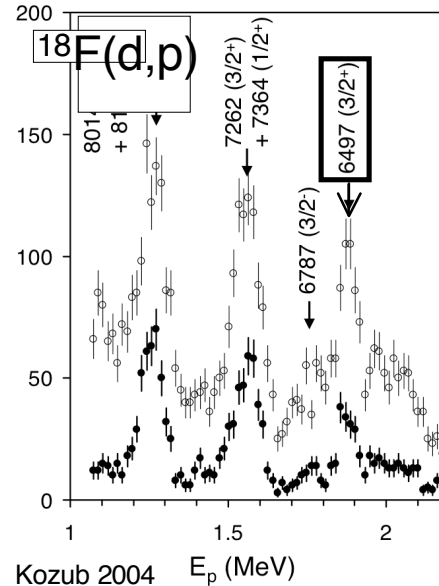
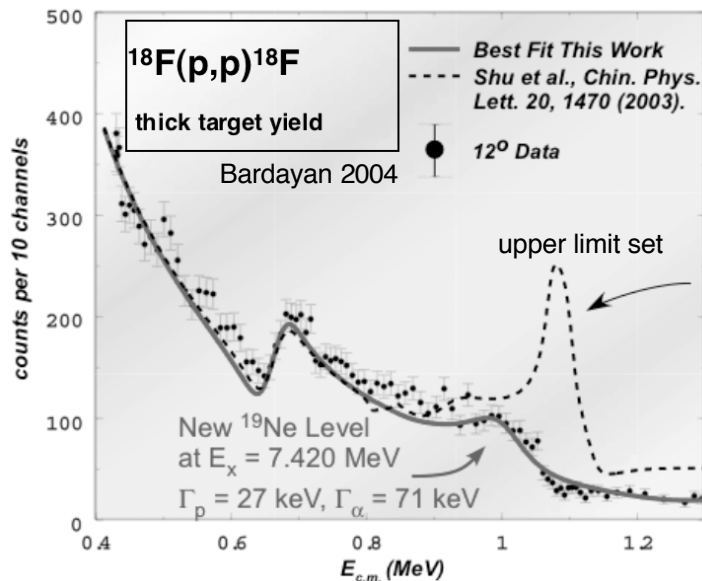
- $^{18}\text{F}(p,\alpha)^{15}\text{O}$ & $^{18}\text{F}(p,\gamma)^{19}\text{Ne}$

- novae & X-ray bursts
- Ph.D. Thesis & paper
- new experiments require new evaluation

- In progress:

- $^{18}\text{F} + p$ update
- $^{33,34}\text{Cl} + p$
- $^{30}\text{P} + p$
- $^{17}\text{O}(p,\alpha)^{14}\text{N}$ & $^{17}\text{O}(p,\gamma)^{18}\text{F}$

$^{18}\text{F}(p,\alpha)^{15}\text{O}$ and $^{18}\text{F}(p,\gamma)^{19}\text{Ne}$ Reaction Rates



recent ORNL radioactive beam measurements motivate new evaluation

High temperature rate better defined with $^{18}\text{F}(p,p)$ measurement -- upper limit set on ^{19}Ne resonant contributions, new resonance found

Low temperature rate better defined with $^{18}\text{F}(d,p)$ measurement -- new spectroscopic factors assigned to low energy resonances

^{19}Ne - ^{19}F analog assignments revised based on R-matrix analysis of old $^{15}\text{N}(\alpha,\alpha)$ data -- changes rate at nova temperatures

re-evaluation in progress ...

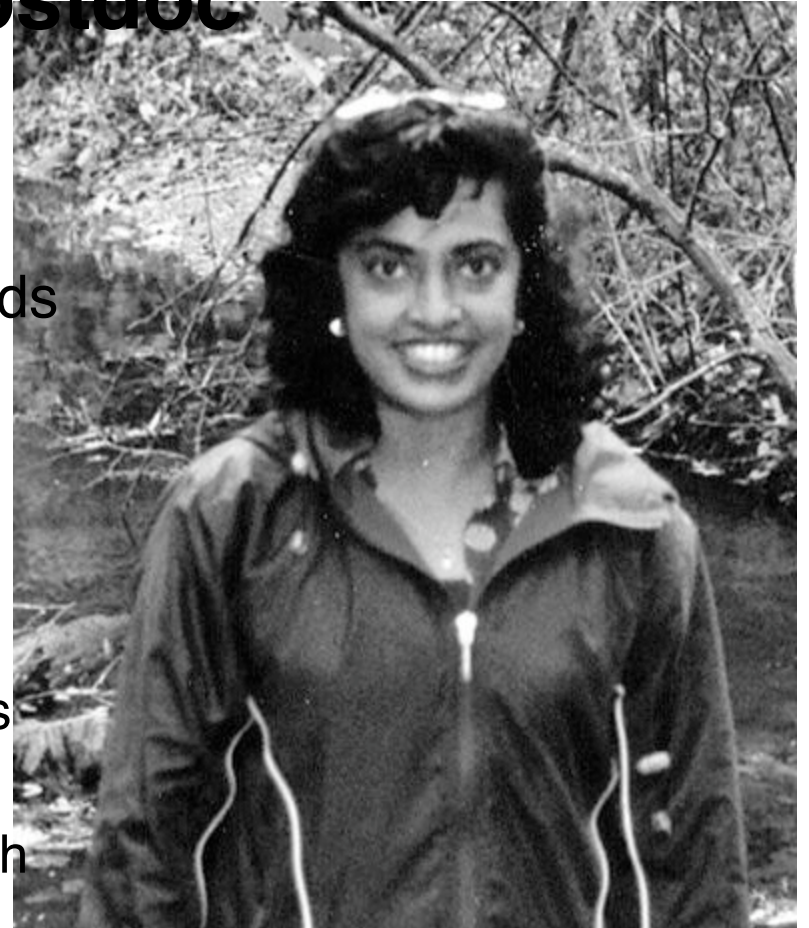
Caroline Nesaraja - New Postdoc

Split-funding from Nuclear Data &
Low Energy Nuclear Physics Funds

Activities at ORNL

Nuclear Astrophysics Data -
nuclear structure evaluations
relevant for astrophysics

Nuclear Astrophysics Measurements with
Radioactive Beams at HRIBF

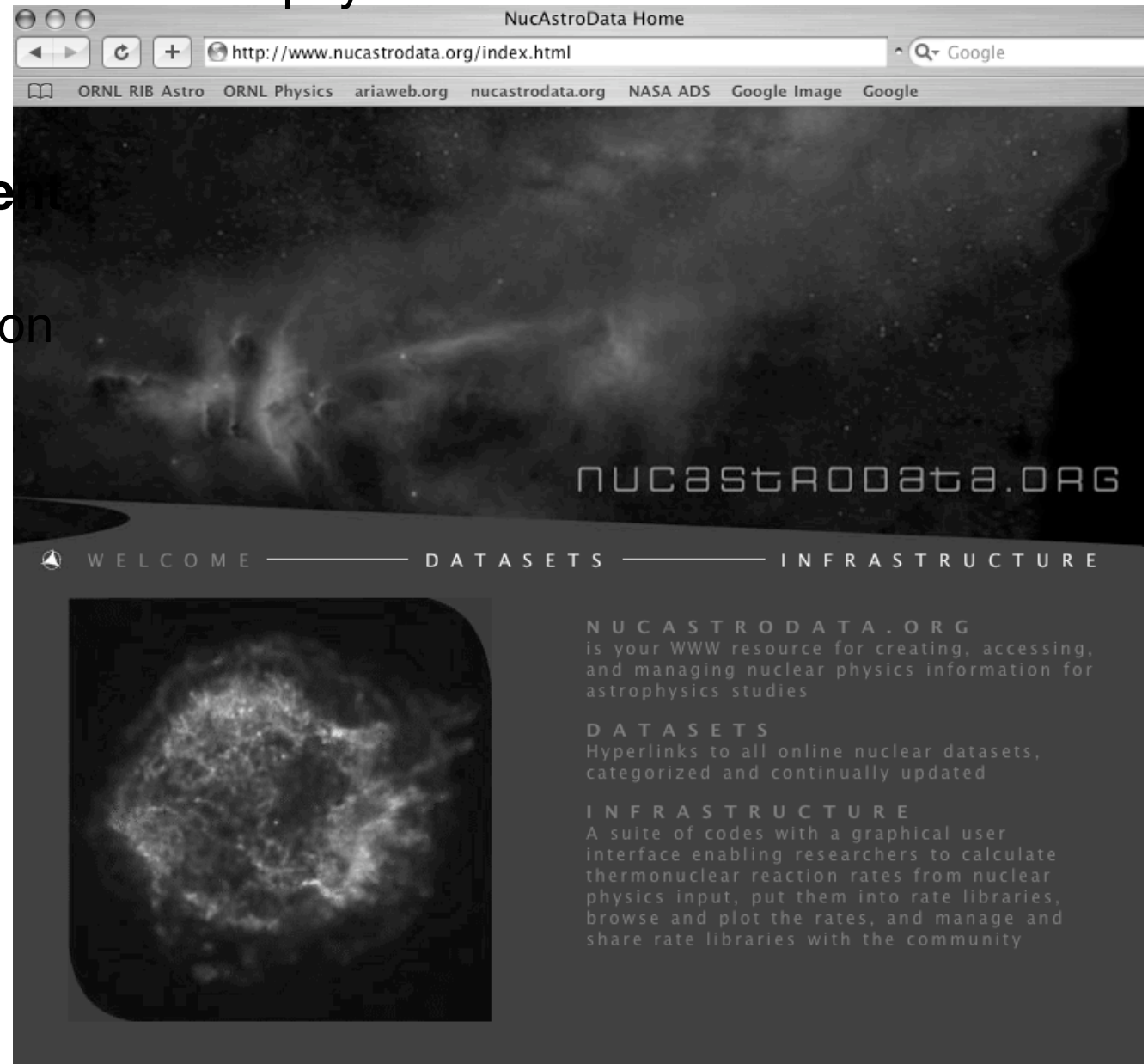


Background in Nuclear Data and Nuclear Astrophysics

Previous work in experimental nuclear astro - capture γ -ray measurements

Previous work at TUNL Nuclear Data Project - **ENSDF** evaluations

- **processing & dissemination** work is needed along with evaluations
- **new website** for Nuclear Astrophysics Data to facilitate this
- provides **convenient entry point** for astrophysics data on the web
- **categorizes & hyperlinks** all available datasets



- **site also hosts new computational infrastructure ...**

NucAstroData Datasets

http://www.nucastrodata.org/datasets.html

ORNL RIB Astro ORNL Physics ariaweb.org nucastrodata.org NASA ADS Google Image Google

NUCASTRODATA.ORG

WELCOME ——— DATASETS ——— INFRASTRUCTURE

categories

- Reaction Rate Collections with Combined Experimental & Theoretical Rates
- Evaluated Experimental Reaction Rate Collections
- Theoretical Reaction Rates
- Weak Reaction Rates
- S-factors
- Experimental & Evaluated Cross Sections
- Theoretical Cross Sections
- Plots of Nuclear Reaction Rates & Cross Sections
- Nuclear Structure

datasets

- NACRE Charged Particle-Induced Reaction Rate Library 1999 - Angulo et al., NACRE Collab. [ULB]
- Charged Particle-Induced Reaction Rates for $A = 20 - 40$ - Iliadis et al. 2001, UNC Chapel Hill [UNC]
- REACLIB Charged Particle-Induced Reaction Rate Updates 1999 - Lugaro, Cambridge [Cambridge]
- Charged Particle-Induced Reaction Rates - Caughlan and Fowler 1988, Caltech [ORNL]
- Light Charged Particle-Induced Reaction Rates - Hale et al., LANL [LANL]

Computational Infrastructure for Nuclear Astrophysics

- suite of FORTRAN codes to ease the processing of nuclear results into astro models, online at **nucastrodata.org**
- user friendly Java Graphical Interface, extensive online help
- With a few mouse clicks, the suite enables Users to:
 - store, renormalize, extrapolate cross sections & s-factors
 - calculate reaction rates from cross sections & s-factors
 - parameterize reaction rates or generate values on a temp grid
 - plot & modify reaction rates
 - insert rates into new or existing libraries
 - create, store, modify, document, merge, & share libraries
 - run, store, compare, & visualize element synthesis calculations

Mentoring in Nuclear Information Technology (MINIT) Program

Issue

M.S. Smith, R.A. Meyer

- USNDP evaluation manpower crisis
 - dropped 50% in 10 years, and 85 % of evaluators over age 55

MINIT - a proposed new approach

- A mechanism to bring young scientists into the USNDP and retain them
- Features the mentoring of young postdoc appointees - nuclear information technologists - by senior evaluators to transfer knowledge
- Uniform training at NNDC for 1 year, then coupling them to senior mentors at USNDP sites for 2 years of evaluation & research work
- Promotion to Staff for the best appointees after their third year
- NNDC provides oversight of this finite-lifetime program
- HOPE: MINIT initiative will spur community discussions & action to proactively resolve the evaluation manpower crisis

Summary

- Recovering from tragic loss of Yurdanur Akovali
- Actinide Evaluations work will continue with focus on $A=241-249$
- Reactions needed to understand stellar explosions (novae & X-ray bursts) are being evaluated
- Exciting Development in Astrophysics Data:
Constructing a long-needed **computational infrastructure** to ensure timely incorporation of nuclear data into astro models
- **MINIT Initiative** developed to address manpower crisis