LANL Report

T. Kawano

Nuclear Physics Group T-16, LANL

Los Alamos

Program Overview, Theory and Evaluation

Evaluations and Theory Development

- New evaluations, based on better physics modeling, new experimental data, and integral data validation — ^{48}Ti and ^{237}Np
- Covariance evaluations for ^{233}U completed
- Light element covariances — still working on code system
- Quantum mechanical microscopic pre-equilibrium theory

Code Development

- McGNASH
  - Direct/semidirect model with Hartree-Fock theory
  - Fission model
- CoH
  - CC calculation on the excited states — coupled to g.s.
  - Kawai-Kerman-McVoy calculation
- CGM — γ-ray cascading for Monte Carlo applications
- Monte Carlo for prompt fission neutron emission

Program Overview, Experiments (for GNEP)

DANCE — neutron capture

- $^{239,240}Pu$, ^{241}Am
- Capture/fission ratio technique established (PPAC)

FIRE House — fission

- $^{239,240,241,242}Pu$ ^{233}U

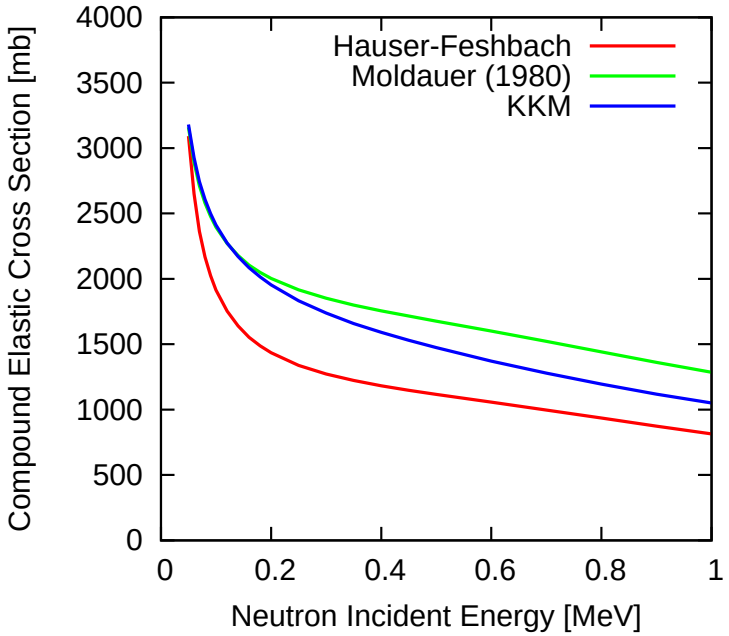
FIGARO — neutron emission

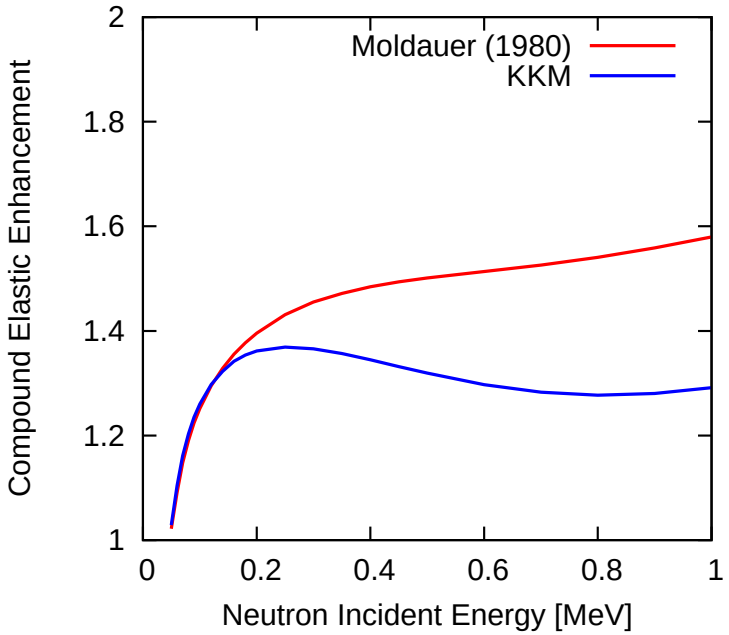
- gas-production data — Zr and Mo

See R.C. Haight's presentation at CSEWG !

Los Alamos

KKM Calculation Results





Coupled-Channels Calculation

- Neutron on ^{238}U, five states are coupled.
- Comparisons with the Hauser-Feshbach and Moldauer theories

Compound Elastic Scattering

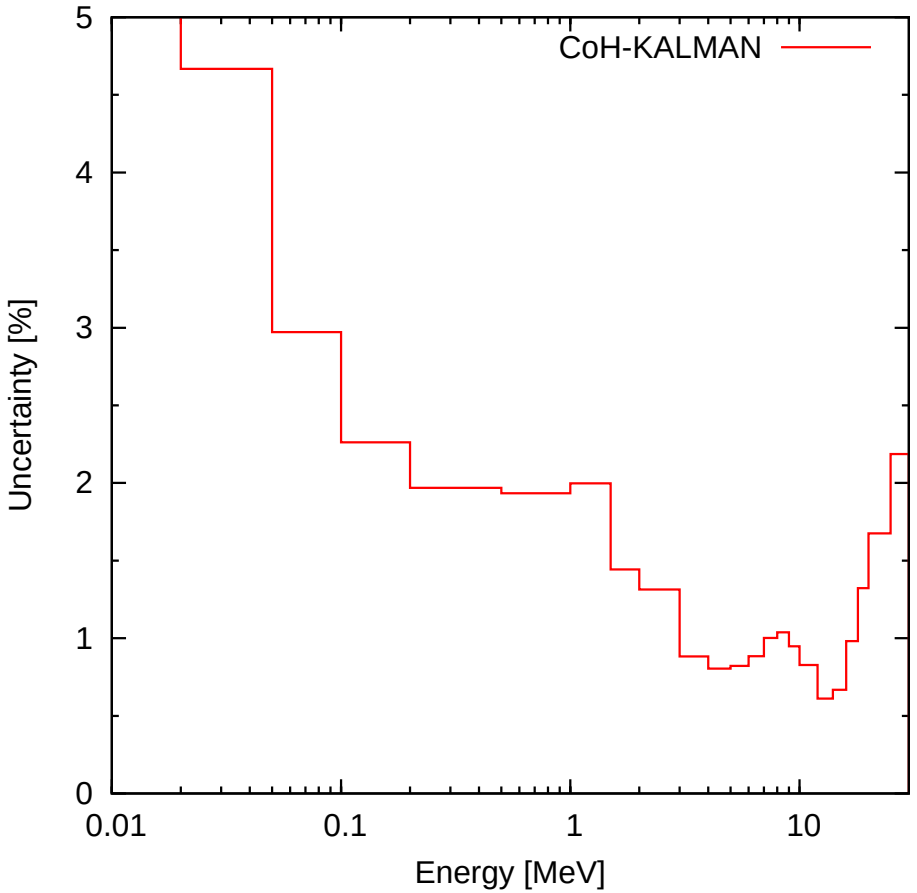
- Both theories give almost identical cross sections at low energies,
- However, large differences are seen when the number of open channels increases.
  - In the KKM theory, the resonance widths are influenced by the direct channels.
  - Moldauer's theory does not consider this effect.

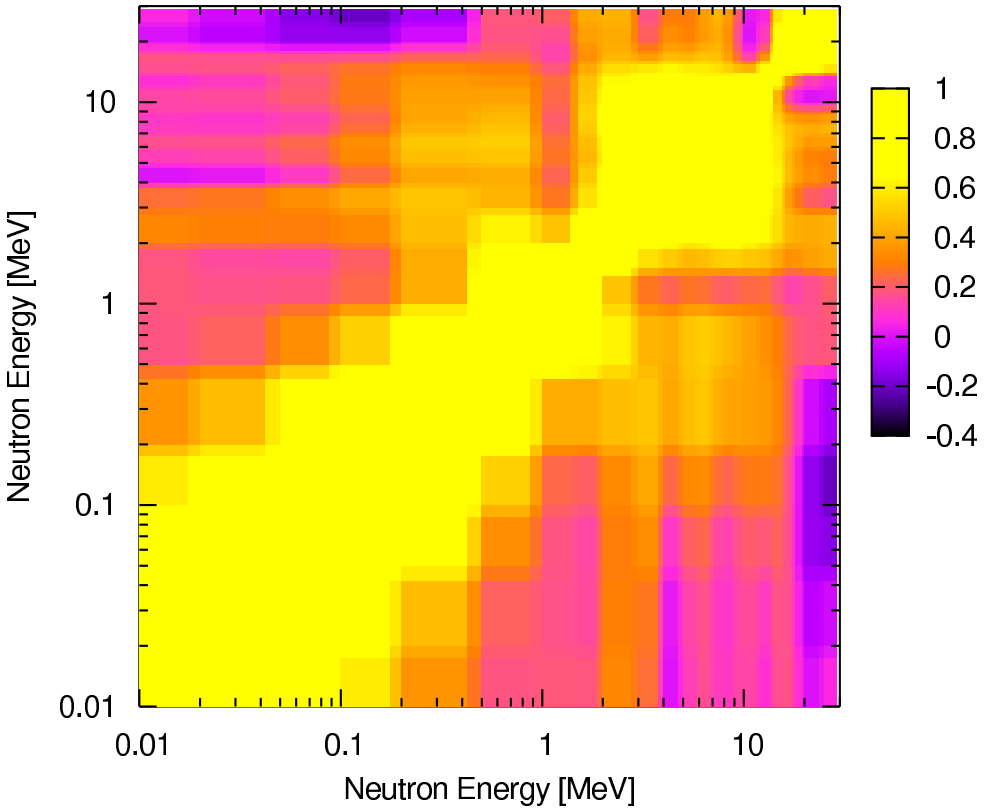
The Hauser-Feshbach-Moldauer model must be modified when direct-reaction channels exist.

Los Alamos

Total Cross Section

Uncertainty and Correlation Matrix

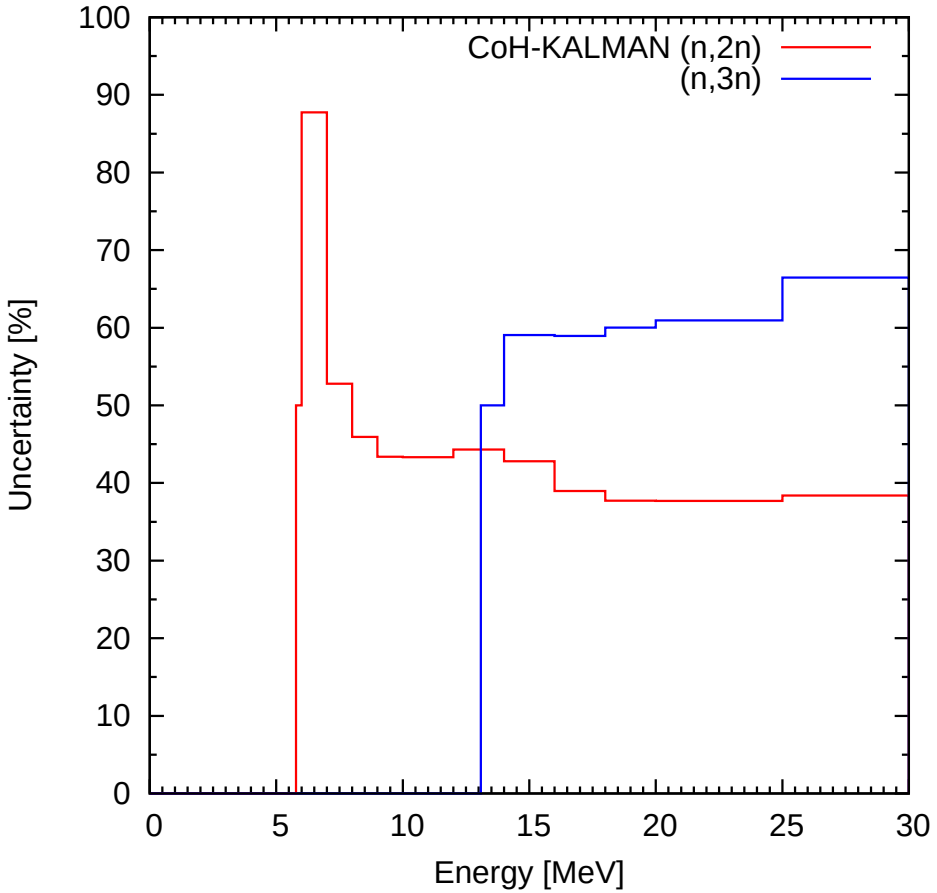


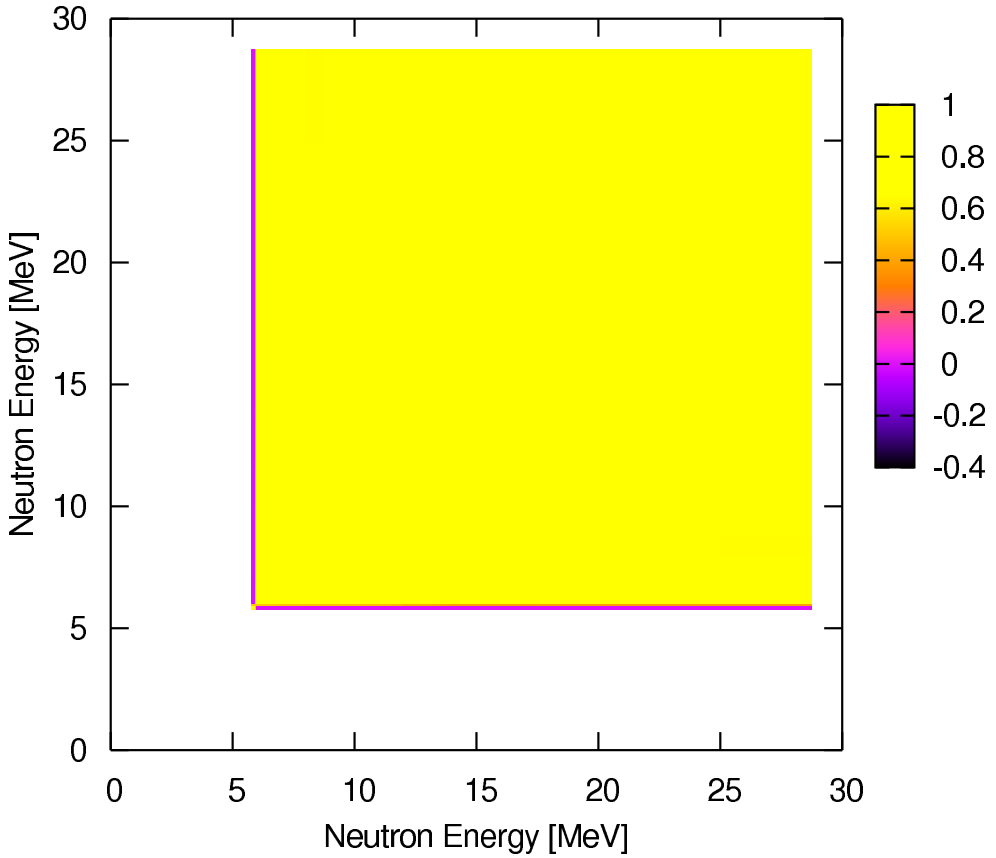


Los Alamos

(n,xn) Cross Section

(n,2n) and (n,3n) Reaction Uncertainty and (n,2n) Correlation

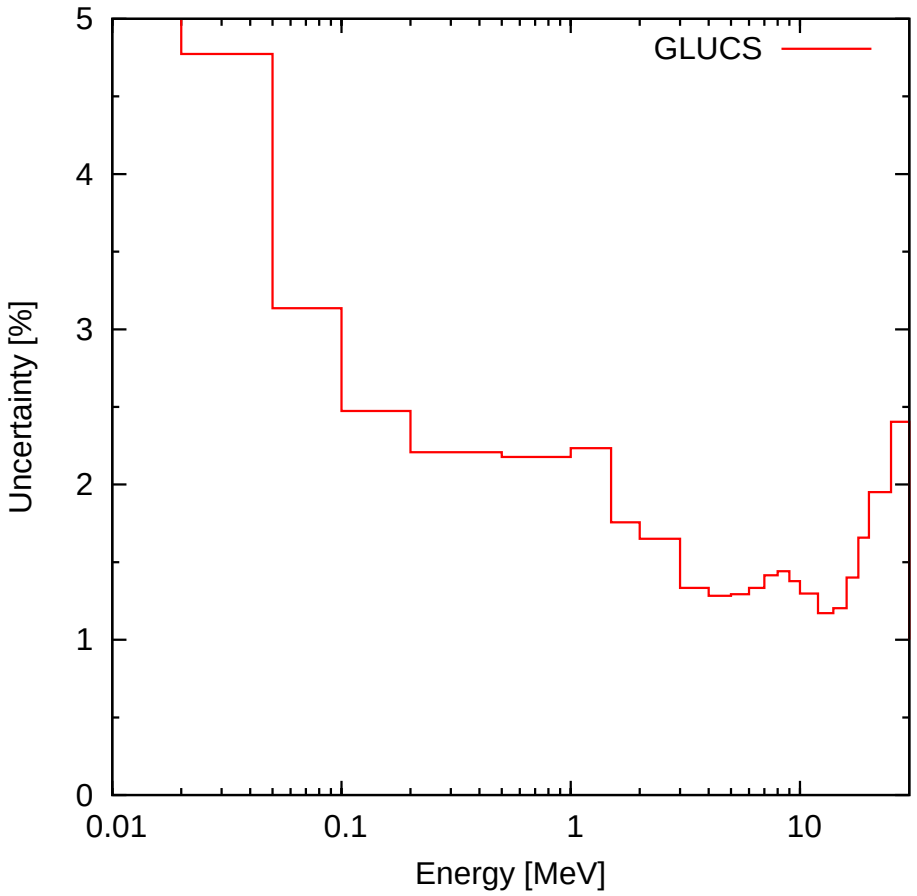




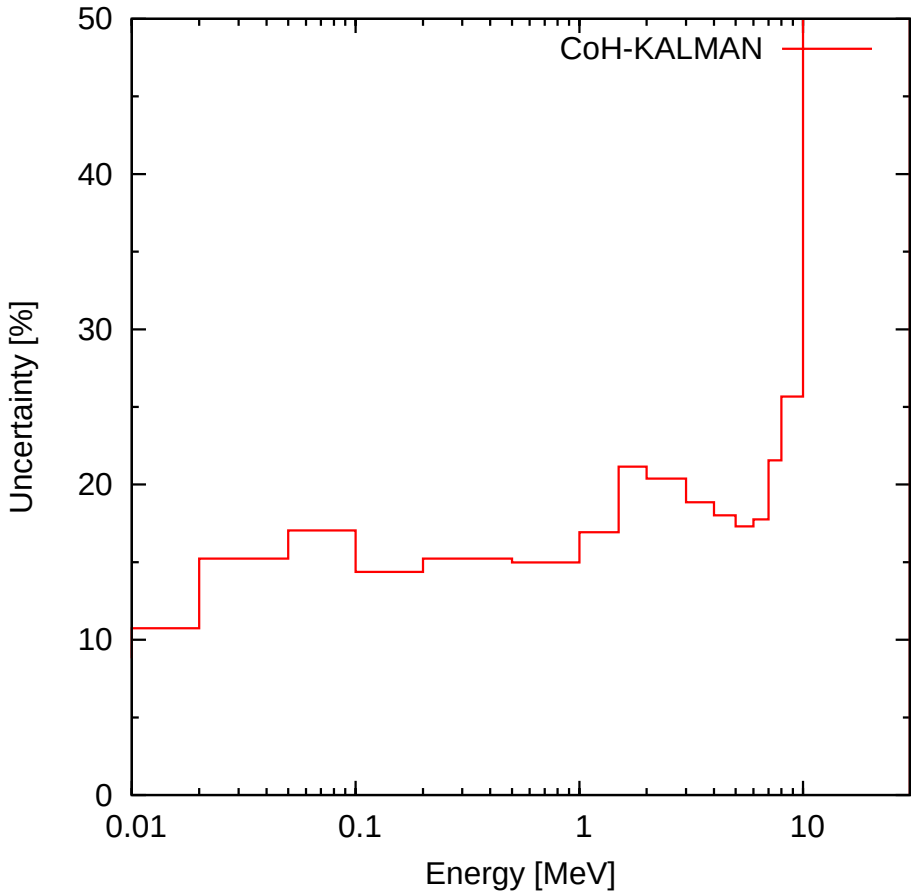
Los Alamos

Fission and Capture Cross Section

Fission



Capture Reaction



Los Alamos

Miscellaneous ...

Personnel Changes (Evaluation)

- P. Talou ← CEA, Cadarache
- L. Bonneau → Bordeaux University
- Oh Soo-Youl, long-term visiting staff member, from KAERI

Workshops

- NRAm2007 : M.B. Chadwick, T. Kawano
  - Nuclear reactions on Americium
    - fission, capture, (n,2n), Pre-eq. on Americium
  - La Fonda Hotel, Santa Fe, 18,19 Sept., and LANL 20 Sept.
  - about 50 participants
- CNR*2007 : J. Escher, F. Dietrich, T. Kawano, I. Thompson
  - Compound nuclear reactions and related topics
    - nuclear structure, superheavy, data, surrogate, pre-eq., fluctuation, fission, capture, scattering, astrophysics
  - Tenaya Lodge, Yosemite, 22–26 Oct.
  - about 55 participants