

# New Issues

- Divergence of gamma strength function at low energies?
- Should we revisit single particle based level densities?
- Why aren't PE effects causing deviations of surrogate fission comparisons at higher energies?
- Is PE depleting higher angular momentum states?

## New Issues (cont)

- Shell stabilization in SHE - will HFB methods give more robust stability than Strutinsky approach?
- What is going on with resonance in the few hundred eV range (ie  $^{147}\text{Sm}$ )?
- Will microscopic fission calculations give complete picture?

# Surrogates

- Explosion of activity.
- Good experimental data with fission
- Progress in simulating capture reactions
- Real movements in theory
  - Ab initio -> phenomenological
    - (Mahir Hussein - Why does surrogate method work so well ?)

# “Local” Future

- Continued theory development in understanding reaction dynamics from entrance channel -> CN
- Need to have accurate surrogate technique for capture reactions.
- Stepping stone for surrogates
  - (n,f) is working well
  - (n, $\gamma$ ) is hard
  - Why not try (n,p) or (n, $\alpha$ )?
    - ( $^{48}\text{V}(n,p)^{48}\text{Ti}$ ,  $^{88}\text{Y}(n,p)^{88}\text{Sr}$ ,  $^{147}\text{Sm}(n,\alpha)^{144}\text{Nd}$ ,...)
    - (“proton” window)
- Revitalization of microscopic fission theory
- Technology to the rescue?
  - STARS/LIBERACE, DANCE, FRS, TPC, Pulse Stacking,....

# Big Picture Future

- Exotic processes will dominate NP (and CN physics)
  - RIBS will be used to do “simple” reactions on exotic species (mostly with inverse kinematics)
    - (the surrogate people will be the ones with this expertise)
  - Reactions on excited nuclei will also be a new frontier
    - (NIF unprecedented particle and photon flux)

# Most Encouraging

- Demographics look great
  - Bright, enthusiastic young people
- The NP “tool box” will be needed to solve basic and applied problems in emerging multidisciplinary fields
- The Future is Bright!