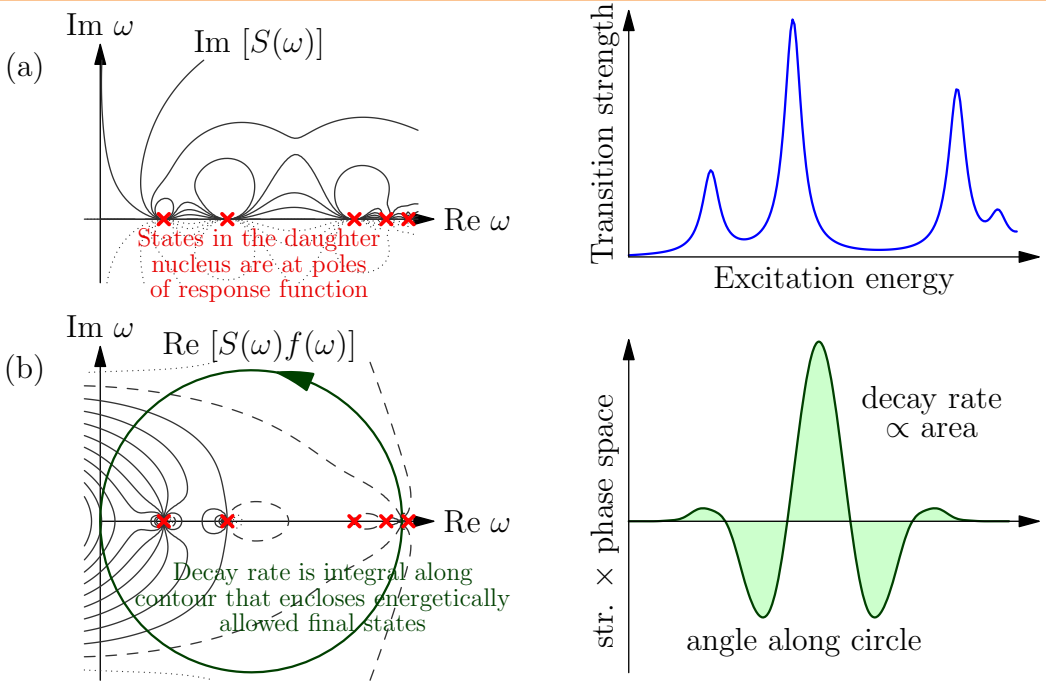
Computing Beta Decay All Over the Nuclear Chart

Objectives

- Develop a fast method for computing beta-decay with energy density functionals.
- Compute beta-decay rates of all even-even nuclei, especially exotic, deformed nuclei that are unreachable in experimental facilities.

Impact

- Crucial input for *r*-process simulations.
- Use of beta-decay and Gamow-Teller resonance data to determine nuclear energy density functionals.



Using the pnFAM, we can compute strength functions (a) and decay rates (b) by examining the linear response in the complex-energy plane of the nuclear mean field to a perturbing force that turns neutrons into protons (or vice versa).

Accomplishments

- We developed *the* ***proton-neutron finite amplitude method*** (pnFAM), a version of the charge-changing QRPA that scales far better than the usual approach, allowing beta-decay surveys across the nuclear chart.
- We started to improve energy density functionals, adding new terms so that they better predict beta decay. Initial results are very promising.

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