Breakup Project

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Reaction Project

During the exercise sessions, you'll be computing and analysing breakup cross sections of halo nuclei

- You'll be using the Fortran code `Chaconne.f` (see Indico)
  That code implements the Coulomb Corrected Eikonal (CCE)
  - runs fast (a few minutes at most)
  - accounts for the P-T interaction at all orders
  - includes a 1st order correction of the Coulomb interaction
- You pick one (or two, or all...) of the reactions
  - ^{11}Be + Pb $\rightarrow$ ^{10}Be + n + Pb @$69A$ MeV
    [Fukuda *et al.* PRC 70, 054606 (2004)]
  - ^{11}Be + C $\rightarrow$ ^{10}Be + n + C @$67A$ MeV
    [Fukuda *et al.* PRC 70, 054606 (2004)]
  - ^{15}C + Pb $\rightarrow$ ^{15}C + n + Pb @$68A$ MeV
    [Nakamura *et al.* PRC 79, 035805 (2009)]
  - ^{19}C + Pb $\rightarrow$ ^{19}C + n + Pb @$67A$ MeV
    [Nakamura *et al.* PRL 83, 1112 (1999)]

Goal Project

- Study the reaction :
  - develop a V_{cf} interaction (within Halo EFT)
    (use the code `Boscos.f` to fit the interaction, see Indico)
  - find suitable optical potentials V_{cT} and V_{fT}
  - check the convergence
  - compare to existing data (available on Indico)
    There are energy and angular distributions
    Don't forget to account for the experimental resolution
  - analyse the agreement/differences with experiment
- Work in groups of 4
  (make sure that one of you has a computer to run the code)
- Friday morning, present the results of your study to the others
- This afternoon session is to decide on the system and set V_{cf}

Resources on Indico

- Codes `Boscos.f` (structure) and `Chaconne.f` (reaction)
  with short user's manuals
  and examples of input files (`*.dat` files)
  and output files (`*.dep` and `*.sdE` files)
- Experimental data (`*.dat` and `*.rtf` files)
  - projectile and target are self-explanatory
  - `erel_*.*` are energy distributions ($d\sigma_{\mathrm{bu}}/dE$) obtained after integration over angular range
  - `angle_*.*` are angular distributions ($d\sigma_{\mathrm{bu}}/d\Omega$) obtained after integration over a definite energy range

  Details about the beam energy, experimental resolution etc.
  can be found in the original articles,
  which are provided in that same folder.