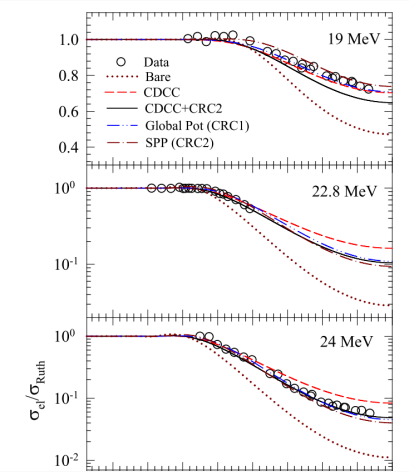
Elastic scattering



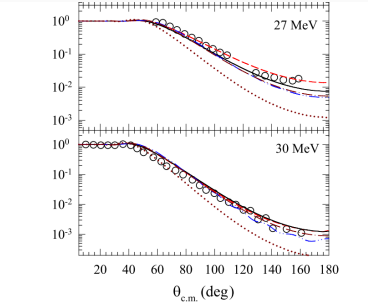


FIG. 1. Elastic scattering data for the $^{6}Li + ^{120}Sn$ system [11,33,34] are compared with the calculations performed for $^{6}Li + ^{124}Sn$ system (see text for details).

- Test entrance channel potentials
- Breakup and $1n$ transfer coupling

Result: effect of breakup couplings is much more than the transfer couplings

$1n$ stripping and $1n$ pickup

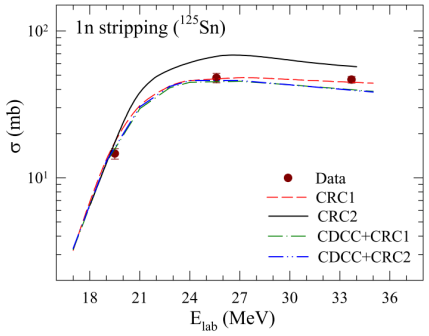


FIG. 2. Measured $1n$ stripping cross sections in the $^6\mathrm{Li} + ^{124}\mathrm{Sn}$ system are compared with the four set of calculations (see text for details).

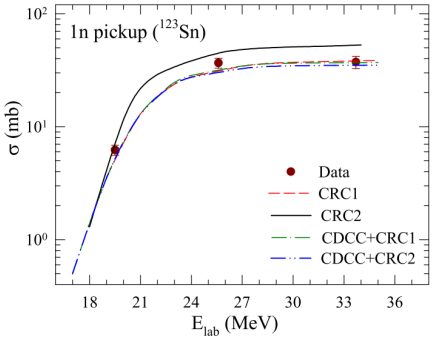


FIG. 3. Measured $1n$ pickup cross sections in the $^6\mathrm{Li} + ^{124}\mathrm{Sn}$ system are compared with the four set of calculations (see text for details).

Ground-state Q value: 0.07 MeV

Ground-state Q value: −1.24 MeV

Ground-state Q value for $1p$ pickup : −6.49 MeV

Systematics of neutron transfer cross sections with ^{6}Li projectile

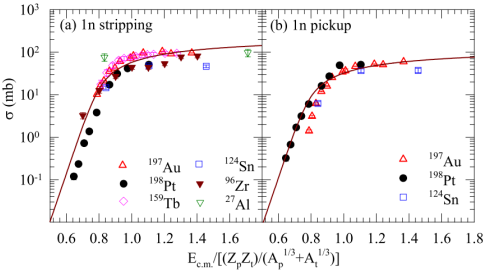


FIG. 4. Systematic behavior of (a) 1n stripping, and (b) 1n pickup cross sections as a function of reduced energy with ^{6}Li projectile on various targets. The transfer cross-section data available for ^{27}Al [35], ^{96}Zr [22], ^{124}Sn [9], ^{159}Tb [36], ^{197}Au [37], ^{198}Pt [38] targets were utilized. Lines are fits to the data.

$$\sigma = \frac{\hbar\omega}{2E_{\mathrm{c.m.}}} R_b^2 \log\left[1+\exp\left(\frac{2\pi}{\hbar\omega}\left(E_{\mathrm{c.m.}} - V_b - a\right)\right)\right] \times \exp\left(-cS_n\right)$$

Process	S_n (MeV)	a (MeV)	c (MeV^{-1})
(a) 1n stripping	5.66	−4.62	0.45
(b) 1n pickup	7.25	−4.92	0.44

a: represent shift in the barrier ;
explains the early onset of these transfer processes ;
similar for both $1n$ stripping and pickup , consistent with S_n being similar;
$1n$ stripping for ^{7}Li is also similar.

c: describe the magnitude.

Reaction mechanism in the ^{6}Li + ^{124}Sn system

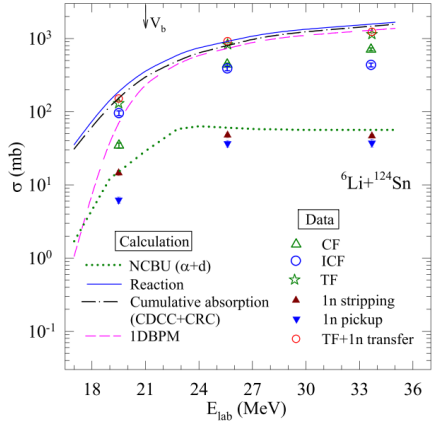


FIG. 5. Measured CF, ICF, transfer cross sections [9] and their sum are compared with the reaction cross sections. NCBU, cumulative absorption, and BPM model calculations are also shown (see text for details).

Reaction cross sections: from the global optical model potential.

CDCC + CRC calculations agree with the sum of TF and $1n$ transfer cross sections.

Fusion cross sections calculated by the barrier penetration model (BPM): underpredict TF at subbarrier energies.