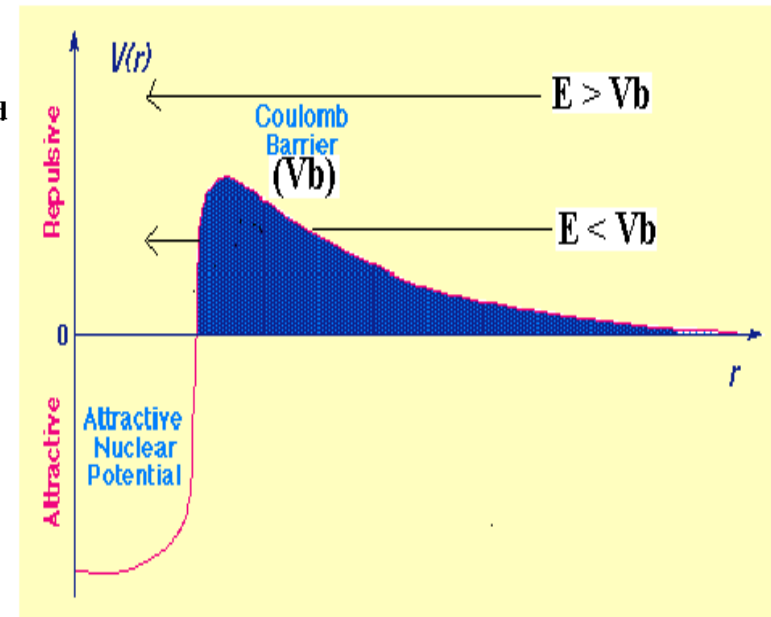
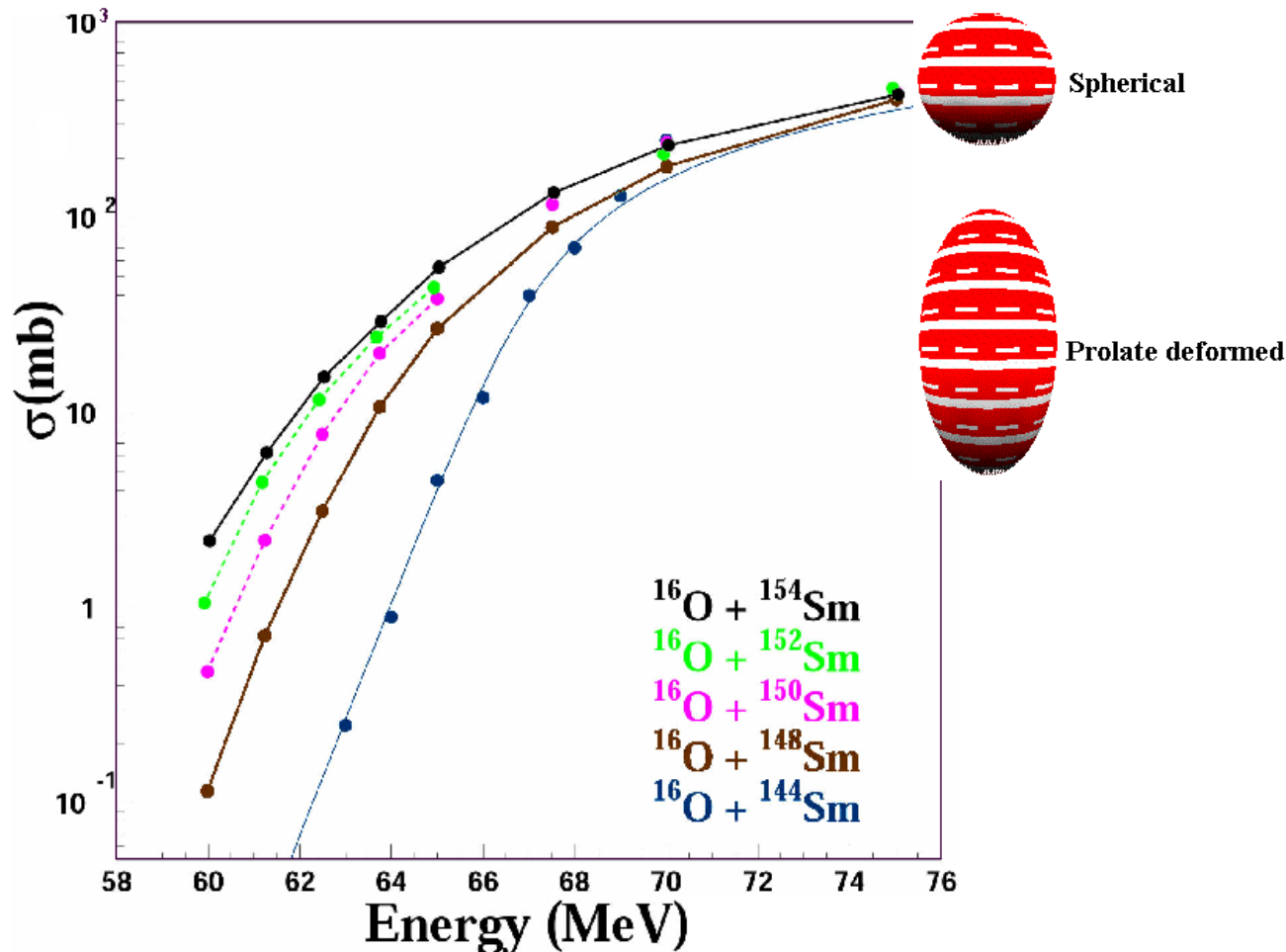


Reactions around the barrier with AIRIS beams

→ **At energies around the Coulomb barrier there is a rich interplay between the structure of the colliding nuclei and the reaction dynamics.**

→ **couplings between the entrance channel and various direct reaction channels are expected to be very important, as also coupling to the continuum for weakly bound nuclei.**

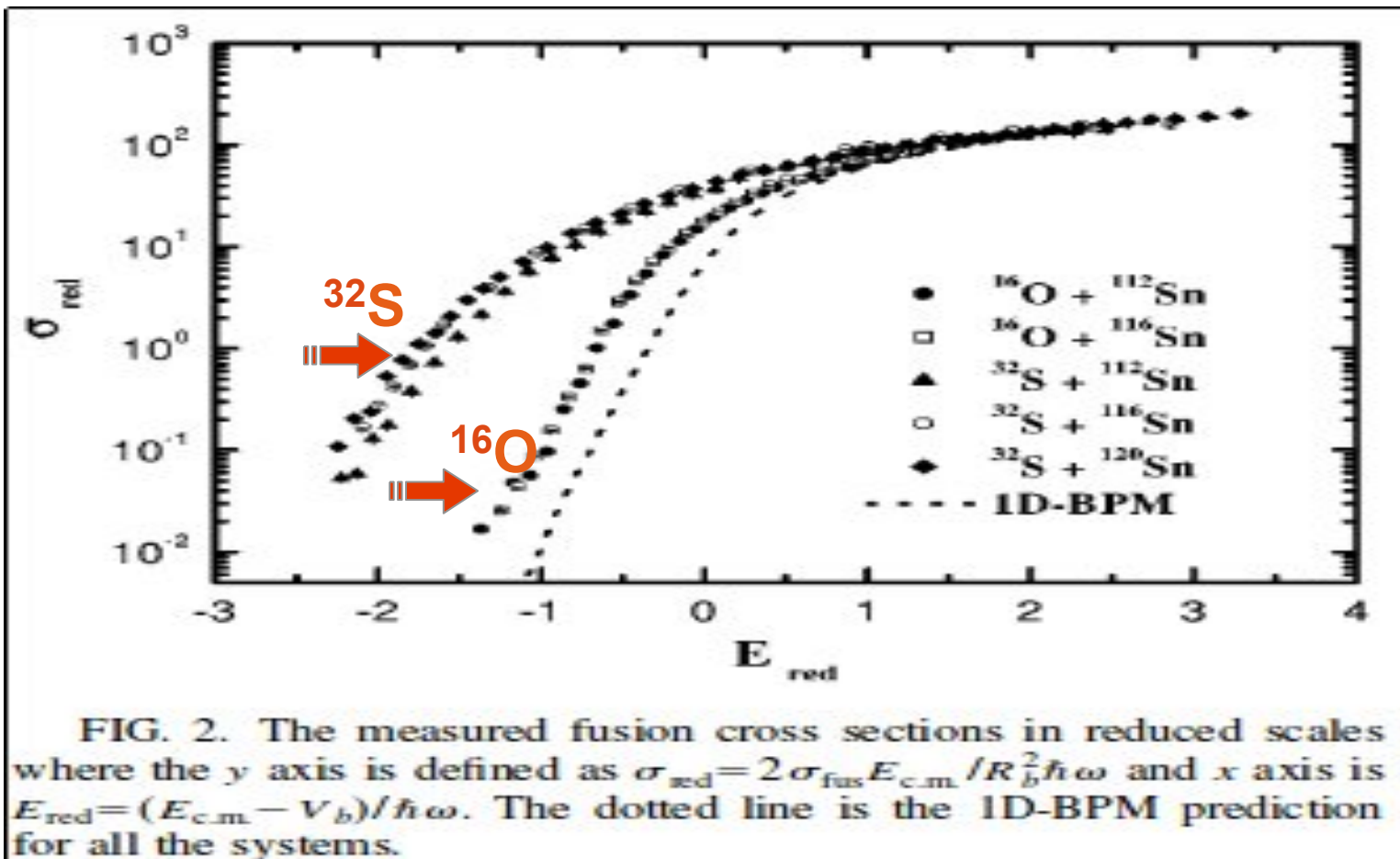
Fusion around the barrier



Stokstad et al, PRL 41 (1978) 465,
 Leigh et al, PRC 52 (1995) 3151

- Quantum tunneling is strongly influenced by presence of other channels.
- Coupled Channel approach

Influence of transfer on fusion cross section: +ive Q-value enhances fusion x-section

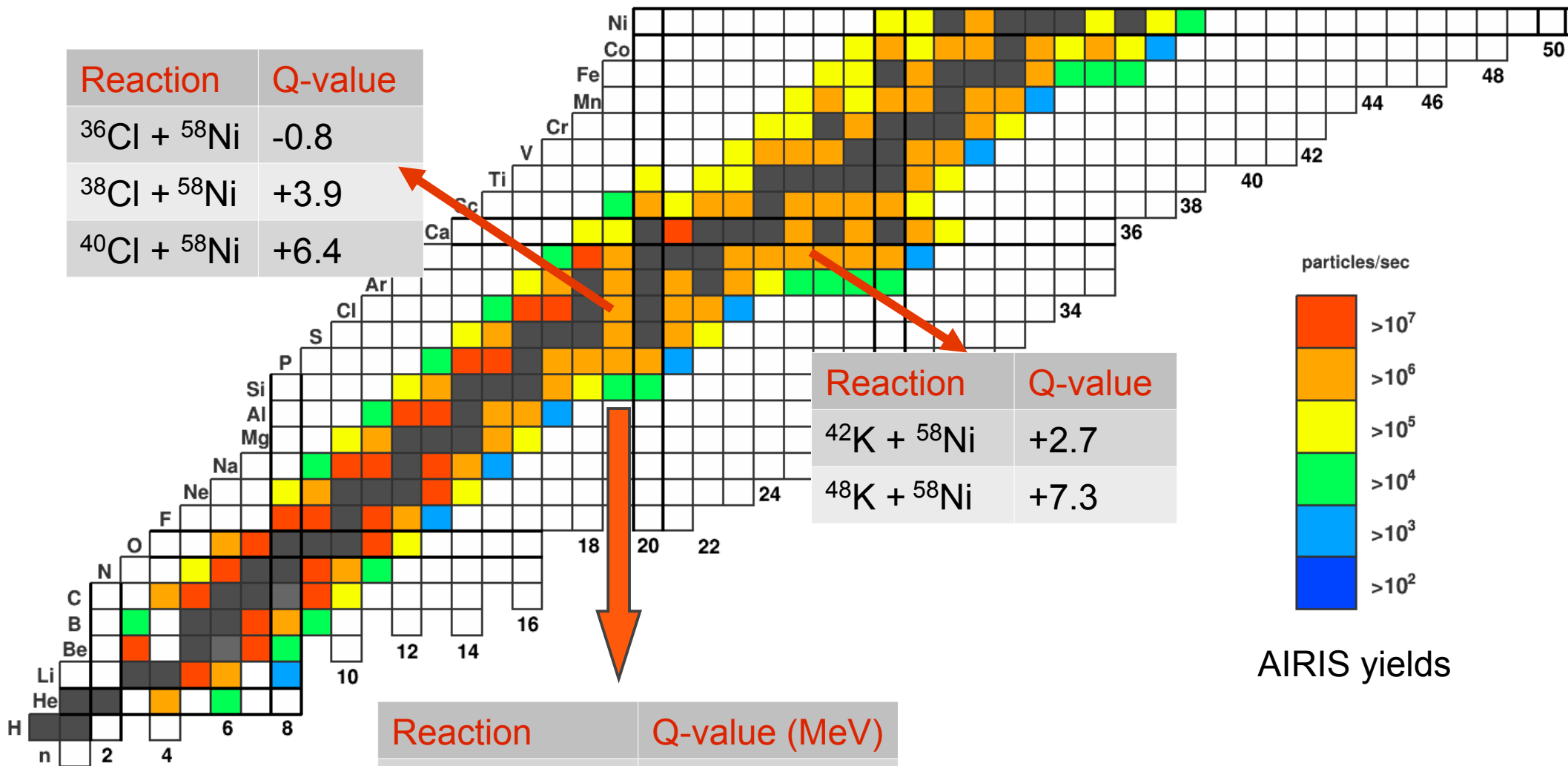


Tripathi *et al*; PRC 65, 014614 (2002)

Not well understood!

AIRIS will provide isotopic chains with different Q-values to explore the role transfer channels play in enhancing fusion cross section At energies around the barrier.

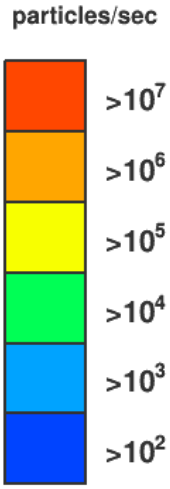
Role of $2n$ transfer channel on the fusion process: systematics along an isotopic chain



Reaction	Q-value
$^{36}\text{Cl} + ^{58}\text{Ni}$	-0.8
$^{38}\text{Cl} + ^{58}\text{Ni}$	+3.9
$^{40}\text{Cl} + ^{58}\text{Ni}$	+6.4

Reaction	Q-value
$^{42}\text{K} + ^{58}\text{Ni}$	+2.7
$^{48}\text{K} + ^{58}\text{Ni}$	+7.3

Reaction	Q-value (MeV)
$^{28}\text{Si} + ^{58}\text{Ni}$	-10.1
$^{30}\text{Si} + ^{58}\text{Ni}$	+1.3
$^{32}\text{Si} + ^{58}\text{Ni}$	+4.6
$^{34}\text{Si} + ^{58}\text{Ni}$	+8.4



AIRIS yields