Purpose

by Bryand Scott force t

analyse structure of

light nuclei as

& cluster and shell m

method

- Generalized Jastrow factor
- Factorized Iwamoto Yamada method

include non central comp

Generalized Jastrow Factor

$$F = F_0 + p\, O_p F_0' \exp(-Dr^2)$$

F_0 F_0' ordinary J. F (use linear comb Gauss)

stais fy many body conidion

(n+1 body → n b transition cond)

Op tensor and L·S operator

Factorized Iwamoto Yamada methods

approx ($\langle\ \rangle$: cluster cal)

$\langle\quad\rangle = \langle 4\text{body}\rangle - m\langle 3\text{body}\rangle + n\langle 2\text{body}\rangle$

this approximate for N body

exact $\langle\quad\rangle = \langle N \rangle$

He^4 $\langle 4 \rangle$ exact

He^5 $m = n = 1$

2 ex. starting model

Energie of α particle (unit Mev)

D state %	3%	9%	15%
Tensor	-22.5	-34	-38
Central	-16	-9.1	-2
Kinetic	15.7	16	17
Total	-22.8	-27	-23

Tensor force coupled by
tensor component of G. J. F
make the more D state mix
the large the binding
Central force stop this
then Physical state is given.

W. F (Wildermuth)

$$A\{\exp\left(-\frac{\alpha}{2}\sum r_{iD}\right) R^{n} \exp\left(-\frac{2}{5}\beta R^{2}\right) \cdot Y_{lm}(R/R)$$

$\frac{\beta}{\alpha}$ ⟶ small, α clusterizatio

	2body		Total
	tensor	Central	(+K.E)
$\beta = 0.6$	-52	-46	-4
$\beta = 0.25$	-52	-45	-12
$\beta = 0.15$	-53	-46	-15
$\beta = 0.12$	-54	-46	-15

$\alpha = 0.7$ Tensor He^5 Central

	4b	−3b	4b	−3b
$\beta = 0.6$	−211	−(−261) = 50,	−61	−(−73) = 12
$\beta = 0.25$	−211	+203 = −8,	−43	+61 = 18
$\beta = 0.15$	−214	+195 = −19,	−41	+55 = 14
$\beta = 0.12$	−215	+199 = −16,	−42	+54 = 12

Values of 2 body calucations are large but almost not contribute to α clusterization.
Coupling of 3 body and 4 body contributes to this explicitly for He^5. by tensor force.

α clusterization

non central

many body effect

L·S component of G. J. F

- Coupled Central force contribute to good result
- Coupled Kinetic E stop central force over contribute

L.S phenomena

- L.S force contribut about half
- L.S component of Generalized Jastrow factor coupled by central force contribute