

We would like to sum $\frac{\vec{11}}{2} + \frac{\vec{11}}{2}$ (2 neutrons with $J = \frac{11}{2}$)

Let's start from a simple case $\vec{J}_1 = \vec{J}_2 = 2$

$\vec{J}_1 + \vec{J}_2 = \vec{2} + \vec{2} = 4, 3, 2, 1, 0$, in principle. We have to consider the 3rd component of the momentum J

$$M_J = M_{J_1} + M_{J_2}$$

So if we do a simple scheme for ^{the sum of} such component we have

$m_{J_1} \backslash m_{J_2}$	2	1	0	-1	-2
2					
1					
0					
-1					
-2					

We would like to sum $\frac{\hbar}{2} + \frac{\hbar}{2}$ (2 neutrons with $J = \frac{11}{2}$)

Let's start from a simple case $\vec{J}_1 = \vec{J}_2 = 2$

$\vec{J}_1 + \vec{J}_2 = \vec{2} + \vec{2} = 4, 3, 2, 1, 0$, in principle. We have to consider the 3rd component of the momentum J

$$M_J = M_{J_1} + M_{J_2}$$

So if we do a simple scheme for ^{the sum of} such component we have

$m_{J_2} \backslash m_{J_1}$	2	1	0	-1	-2
2	•	⊗	×	×	×
1	⊙	•	×	×	×
0	•	•	•	×	×
-1	•	•	•	•	×
-2	•	•	•	•	•

① We will see which states are possible •

And which are a repetition ×

⇒ Note that i.e. ⊙ is a repetition since we have two identical ptc

We would like to sum $\frac{\hbar}{2} + \frac{\hbar}{2}$ (2 neutrons with $J = \frac{11}{2}$)

Let's start from a simple case $\vec{J}_1 = \vec{J}_2 = 2$

$\vec{J}_1 + \vec{J}_2 = \vec{2} + \vec{2} = 4, 3, 2, 1, 0$, in principle. We have to consider the 3rd component of the momentum J

$$M_J = M_{J_1} + M_{J_2}$$

So if we do a simple scheme for ^{the sum of} such component we have

$m_{J_2} \backslash m_{J_1}$	2	1	0	-1	-2
2	• 4	• X	• X	• X	• X
1	• 3	• 2	• X	• X	• X
0	• 2	• 1	• 0	• X	• X
-1	• 1	• 0	• -1	• -2	• X
-2	• 0	• -1	• -2	• -3	• -4

① We will see which states are possible •

And which are a repetition X

⇒ Note that i.e. 0 is a repetition since we have two identical pts

② We then write which is the M_J of each pair *

We would like to sum $\frac{\hbar}{2} + \frac{\hbar}{2}$ (2 neutrons with $J = \frac{1}{2}$)

Let's start from a simple case $\vec{J}_1 = \vec{J}_2 = 2$

$\vec{J}_1 + \vec{J}_2 = \vec{2} + \vec{2} = 4, 3, 2, 1, 0$, in principle. We have to consider the 3rd component of the momentum J

$$M_J = M_{J_1} + M_{J_2}$$

So if we do a simple scheme for ^{the sum of} such component we have

$m_{J_2} \backslash m_{J_1}$	2	1	0	-1	-2
2	• 4	• X	• X	• X	• X
1	• 3	• 2	• X	• X	• X
0	• 2	• 1	• 0	• X	• X
-1	• 1	• 0	• -1	• -2	• X
-2	• 0	• -1	• -2	• -3	• -4

① We will see which states are possible •

And which are a repetition X

⇒ Note that i.e. 0 is a repetition since we have two identical ptc

② We then write which is the M_J of each pair *

③ We identify the J which corresponds to different $m_{J_1} + m_{J_2}$

We would like to sum $\vec{J}_1 + \vec{J}_2$ (2 neutrons with $J = \frac{11}{2}$)

Let's start from a simple case $\vec{J}_1 = \vec{J}_2 = 2$

$\vec{J}_1 + \vec{J}_2 = \vec{2} + \vec{2} = 4, 3, 2, 1, 0$, in principle. We have to consider the 3rd component of the momentum J

$$M_J = M_{J_1} + M_{J_2}$$

So if we do a simple scheme for ^{the sum of} such component we have

$m_{J_2} \backslash m_{J_1}$	2	1	0	-1	-2
2	• 4	• X	• X	• X	• X
1	• 3	• 2	• X	• X	• X
0	• 2	• 1	• 0	• X	• X
-1	• 1	• 0	• -1	• -2	• X
-2	• 0	• -1	• -2	• -3	• -4

Annotations in the table:
 - A red box highlights the diagonal elements (4, 3, 2, 1, 0, -1, -2, -3, -4) with arrows pointing to $J=4$.
 - A red box highlights the elements (2, 1, 0, -1, -2) with arrows pointing to $J=2$.
 - A red box highlights the elements (0, -1, -2) with an arrow pointing to $J=0$.
 - Elements marked with 'X' are circled in green.

① We will see which states are possible •

And which are a repetition X

⇒ Note that i.e. 0 is a repetition since we have two identical ptc

② We then write which is the M_J of each pair *

③ We identify the J which corresponds to different $m_{J_1} + m_{J_2}$

At the end we have only $J=0, 2, 4$ which are allowed.

Odd J are not allowed.

A similar conclusion can be drawn also for $\vec{J}_1 + \vec{J}_2$: Only

$J = 10, 8, 6, 4, 2, 0$ are allowed.