$\vec{S} \in$
R^3
$\vec{S} =$
(S_x, S_y, S_z)
S_{x_i}
$\hat{x_i}$
$\vec{S}$
R^3
${}_n(S) =$
$\vec{S} \cdot$
$\hat{n}$,
S_n
$[\vec{S}$
$\hat{n}$
R^3
$\hat{n}$
$\vec{S}$
S_n
S_n
$\vec{S}$
$\hat{n}$
m
com-
pat-
i-
ble
S_n
S_m
R^3
S_n
S_n
S_n
S_n
S_n
quan-
tized
$\vec{S}$
S_n
S_x
$\vec{S}$
S_z
$\hat{n}$
m
S_n
S_m
in-
com-
pat-
i-
ble
S_n
S_n
S_m
ψ
$\mathcal{H}$
$\frac{1}{2}$
$\mathcal{H} = \{\alpha + + \beta -\}$
(1)
$\alpha, \beta \in$
C
$\mathcal{H}$
ψ
S
$\mathcal{A}$
A
$\mathcal{H}$
$\mathcal{A}$
A
S_z
${}_z \doteq$
$\frac{\hbar}{2} 10$
$0 -$
1
z
$(S_z = \frac{\hbar}{2})$
$\psi =$
$+_z \doteq$
1
0
z
$(S_z = \frac{-\hbar}{2})$
$\psi =$
$-_z \doteq$
0
1
S_y
S_z
${}_y \doteq$
$\frac{\hbar}{2} 0 -$
i
$i 0$
y
$(S_y = \frac{\hbar}{2})$