

$$H \begin{pmatrix} |\uparrow, \downarrow\rangle \\ |\downarrow, \uparrow\rangle \\ |\uparrow\downarrow, \cdot\rangle \\ |\cdot, \uparrow\downarrow\rangle \end{pmatrix} = \begin{pmatrix} t & -t & t & -t \\ -t & t & U & U \end{pmatrix} \begin{pmatrix} |\uparrow, \downarrow\rangle \\ |\downarrow, \uparrow\rangle \\ |\uparrow\downarrow, \cdot\rangle \\ |\cdot, \uparrow\downarrow\rangle \end{pmatrix}$$