

$$|\frac{3}{2}, +\frac{3}{2}\rangle = \uparrow\uparrow\uparrow$$

$$|\frac{3}{2}, +\frac{1}{2}\rangle = \frac{1}{\sqrt{3}} (\uparrow\uparrow\downarrow + \uparrow\downarrow\uparrow + \downarrow\uparrow\uparrow)$$

$$|\frac{3}{2}, -\frac{1}{2}\rangle = \frac{1}{\sqrt{3}} (\downarrow\downarrow\uparrow + \downarrow\uparrow\downarrow + \uparrow\downarrow\downarrow)$$

$$|\frac{3}{2}, -\frac{3}{2}\rangle = \downarrow\downarrow\downarrow$$

Symmetric under exchange  
of any two quarks

$$|\frac{1}{2}, -\frac{1}{2}\rangle = -\frac{1}{\sqrt{6}} (2\downarrow\downarrow\uparrow - \uparrow\downarrow\downarrow - \downarrow\uparrow\downarrow)$$

$$|\frac{1}{2}, +\frac{1}{2}\rangle = \frac{1}{\sqrt{6}} (2\uparrow\uparrow\downarrow - \uparrow\downarrow\uparrow - \downarrow\uparrow\uparrow)$$

Mixed symmetry  
Symmetric under exchange  
of 1<sup>st</sup> and 2<sup>nd</sup> quark

$$|\frac{1}{2}, -\frac{1}{2}\rangle = \frac{1}{\sqrt{2}} (\uparrow\downarrow\downarrow - \downarrow\uparrow\downarrow)$$

$$|\frac{1}{2}, +\frac{1}{2}\rangle = \frac{1}{\sqrt{2}} (\uparrow\downarrow\uparrow - \downarrow\uparrow\uparrow)$$

Mixed symmetry  
Anti-symmetric under exchange  
of 1<sup>st</sup> and 2<sup>nd</sup> quark