$$|N/2, N/2\rangle = \frac{(a^+)^{N/2}(b^+)^{N/2}}{(N/2)!}|0,0\rangle \xrightarrow{BS} \left(\frac{a^+ +}{}\right.$$

$$\xrightarrow{BS} \frac{(a^+ + ib^+)^{N/2}(ia^+ + b^+)^{N/2}}{2^{N/2}(N/2)!}|0,0\rangle$$

$$= \frac{i^{N/2}(a^{+2} + b^{+2})^{N/2}}{2^{N/2}(N/2)!}|0,0\rangle = \sum_{k=0}^{N/2}\binom{N/2}{k}(a^+)^{2k}(b^+)^{N/2-K^2}$$

JESSICA COOPER

As she came to the end of her undergraduate degree, Jessica Cooper decided that she wanted to continue learning about physics, which led her to attend a postgraduate open day at the University of Leeds.

Jessica did a BSc Physics and Astrophysics at the University of York and had enjoyed the quantum physics element of her course. "I spoke to several academics who encouraged me to look at Dr Dunningham's work," she says. "And then I met him at the open day and discussed the possibility of my undertaking a PhD in the Quantum Information research group." Jessica and Dr Dunningham were successful in applying for a University of Leeds Research Scholarship to fund Jessica's PhD.

Jessica's research is focused on Bose-Einstein condensates - atoms that exist in a singular state at very low temperatures - and how these might be used as a measurement tool at a quantum scale. "For example, gravity waves are too small to be measured with traditional measurement tools and some current research is looking at how Bose-Einstein condensates might be used to detect them," says Jessica.

Now in the final year of her PhD, Jessica is still undecided about her future career, but says she has gained a great number of transferable skills during her time at Leeds. Through the award of one of the University's Ogden Teaching Fellowships, she has spent a lot of time in schools in the region giving talks to pupils about her subject.

"My communication skills have developed throughout my PhD and I'm now able to talk about my work with a really diverse range of audiences – from other academics through to schoolchildren," says Jessica. "I've also gained a lot of universal computing skills and my confidence has increased."

Jessica has also had the opportunity to travel, either to conferences or to visit and work with other research groups. "I've been to Singapore, Canada, Italy and New Zealand," she says. "I've learnt a lot about team working and building effective relationships quickly in order to get the most out of a study trip."