

Are there individuals in physics and if so what are they?

James Ladyman

It was once widely agreed that quantum particles violate the Principle of the Identity of Indiscernibles and are not individuals. Simon Saunders challenged this consensus and argued that fermions satisfy a weakened form of PII. More recently it has been argued by Fred Muller and Michael Seevinck that even bosons are weakly discernible. However, these authors are agreed that objects that are only weakly discernible are not individuals. Similarly, Steven French and Decio Krause argue that quantum particles are non-individual objects. However, it is not clear that objects being weakly discernible is of any metaphysical significance. Also, it is not clear that naturalists must reject primitive identity and individuality. Furthermore, are non-fundamental objects in physics and quasi-particles to be regarded as individuals? I argue for the real patterns account of individuals in physics and for an associated weak notion of individuality according to which all quantum particles are individuals after all.