# Exciting an avalanche

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An individual electron does not have a large influence on the world around it, which makes detection tricky. One successful approach is to use avalanche amplification: one seed electron generates two 'daughter' electrons; this is repeated to create four, and so on, until a measurable current is produced. Gabriele Bulgarini and colleagues have now applied this idea to the charge carriers trapped in single quantum dots.

Excitons — an electron and its positively charged counterpart, a hole — in a quantum dot are one candidate for quantum bits. However, studies on single quantum dots often require that a measurement is repeated thousands of times: not ideal in a superfast quantum computer.

Bulgarini *et al*. integrated their quantum dot into a nanowire avalanche photodetector. A photon generates a single exciton in the dot. The electron and hole tunnel out of the dot in opposite directions into a multiplication region, thus generating a useful photocurrent. The team show that 120 individual excitation events were required for electrical read-out of the exciton — 10,000 times fewer than other approaches and a significant step towards the ultimate goal of single-shot read-out.

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