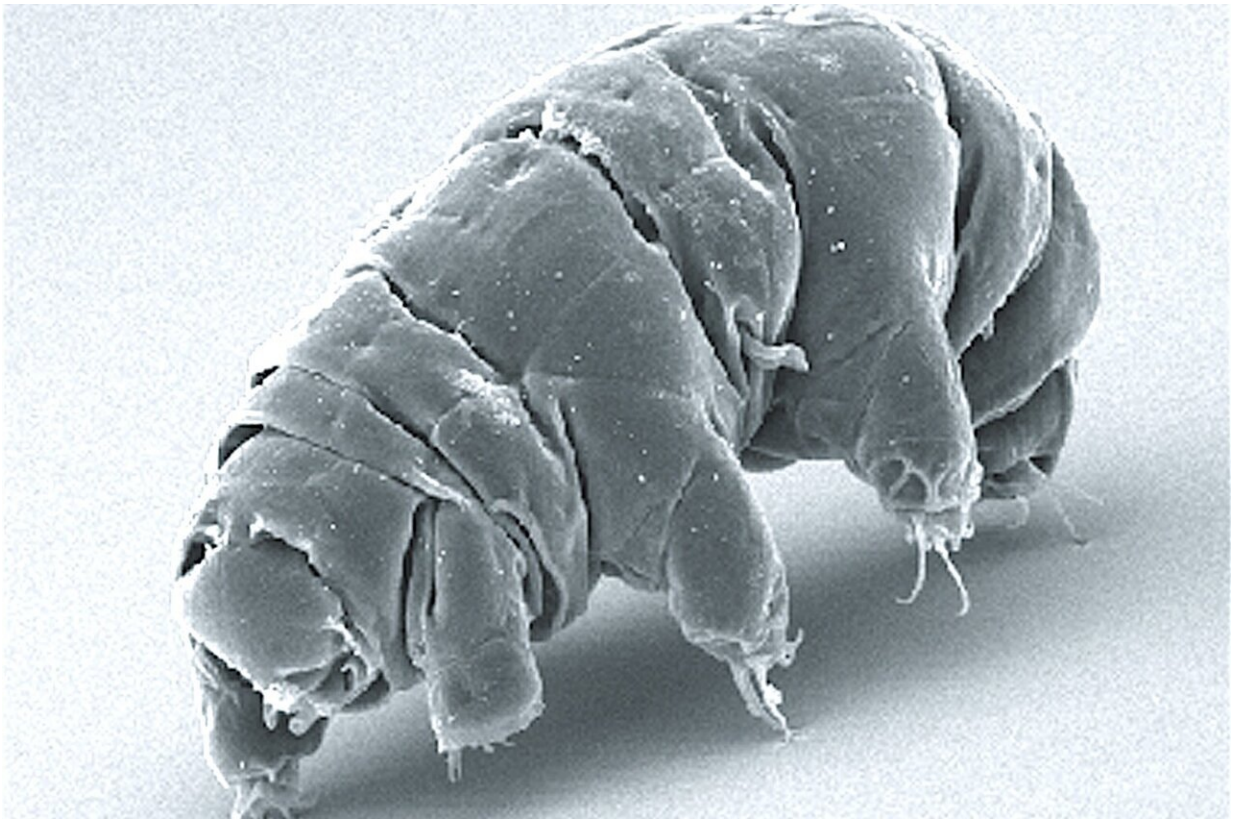
Peers dispute claim that tardigrades were entangled with qubits

December 20 2021, by Bob Yirka



SEM image of Milnesium tardigradum in active state. Credit: *PLoS ONE* 7(9): e45682. doi:10.1371/journal.pone.0045682

Scientists and journalists alike are disputing claims made by an international team of researchers that they had entangled a tardigrade

with superconducting qubits. Their paper is published on the arXiv preprint server. Virtually all of those with an opinion pointed out that the work by the researchers in this new effort did not involve entanglement.

Entanglement is a quantum superstate in which two objects such as atomic particles cannot be described independently of the state of the others—they are linked in a way that cannot be explained. Prior research has shown that entanglement happens naturally in nature and can be produced in a lab under specified conditions. To date, all such man-made entanglements have involved tiny objects, such as ions, nanoparticles or extremely tiny diamonds. Such experiments require cold temperatures and targets that are well organized. Notably, tardigrades, like all living creatures, are not well organized.

In their work, the researchers chilled a tardigrade down to near absolute zero and exposed it to very low pressure. They then placed it on top of two superconducting transmon qubits that were part of a quantum computer and found what they described as coupling. They then claimed that the coupling they had observed was evidence of entanglement between the tardigrade and the qubits.

Most of those commenting on the research noted that the coupling observed by the researchers could have been observed with or without entanglement. They also noted that placing a tardigrade on top of a qubit could result in altering the frequency of the qubit, but that is not the same thing as the two being entangled. Also, the tardigrade was not able to act as a single quantum object. In short, they suggest that the claim of entangling a tardigrade with a pair of qubits was completely false.

One thing that most did agree on was that the researchers had found a new level of robustness for tardigrades—some of those in the experiments had survived extremely inhospitable conditions near absolute zero and pressures as low as 0.000006 millibars for up to 17

days, and then revived and resumed their regular existence after conditions were returned to normal.

More information: K. S. Lee et al, Entanglement between superconducting qubits and a tardigrade. arXiv:2112.07978v2 [quant-ph], arxiv.org/abs/2112.07978