

CAL12-2012-020004

Abstract for an Invited Paper  
for the CAL12 Meeting of  
the American Physical Society

### **Quantum Matters**

CHETAN NAYAK, UCSB and Microsoft Station Q

Physicists have discovered states of matter where there are particles with properties not possessed by any particles seen in the vacuum. These particles are collective excitations of the electrons in these materials. Their exotic properties are a consequence of quantum mechanics and have no analog in the familiar classical world. They can be manifested when, for instance, a particle simultaneously takes two different paths from point A to point B and they interfere. Remarkably, these particles might be harnessed for a quantum computer, a hypothetical computer that could solve problems far beyond the reach of today's computers.