

Bose-Einstein Condensate macroscopic entanglement teleportation and water - a climate stop-gap solution.

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Bose Einstein Condensate teleportation using quantum entanglement is discussed as a potential future technology for the large-scale transport of inorganic matter. This concept is then extended into the scaling of small-scale entanglement teleportation devices into mass-produced assemblies to transport simple substances like ocean water and the potential application of this concept for global challenges like sea level rise from global climate change induced ice melt.

"If you want to find the secrets of the universe, think in terms of energy, frequency and vibration."
-- Nikola Tesla

"In condensed matter physics, a Bose-Einstein condensate (BEC) is a state of matter which is typically formed when a gas of bosons at low densities is cooled to temperatures very close to absolute zero (-273.15 °C or -459.67 °F). Under such conditions, a large fraction of bosons occupy the lowest quantum state, at which point microscopic quantum mechanical phenomena, particularly wavefunction interference, become apparent macroscopically."
-- Bose Einstein Condensate -- Wikipedia.org

"Reality of the problem is that glaciers are sliding into the sea ten times faster than before... there's more meltwater created on the ice surface every summer, because of global warming. The water runs down moulins until it reaches the undersides of the glaciers... It lubricates the ice flow over the rock beds. Modeling suggests that if you pump out about a third to a half of the water underneath the glaciers, you get them to slow down enough to reduce their shear heat also, and that water doesn't appear in the first place. The glaciers cool, bottom out, refreeze, to the rock, go back to their old speed. So you only need to pump out something like thirty cubic kilometers, from under the biggest glaciers in Antarctica and Greenland"
-- Kim Stanley Robinson -- The Ministry for the Future

"In my travels, I have seen the future... And it is a strange future indeed. The world, ladies and gentlemen, is on the brink of new, terrifying possibilities. What you are about to witness is not magic. It is purely science."
-- Robert Angier - film adaptation of Christopher Priest's The Prestige.

Consider teleportation. Fiction stories attempt to reduce this to a problem of super-computing, but it is not. A human being is made of trillions of atoms and atoms that are in motion. Separation and reassembly, even if done incredibly fast, likely kills the human subject. So, logically at least, in this stage of the game i.e., ignoring far-future quantum gravitational methods like wormholes, we need an "all or nothing" technique. Quantum entanglement related teleportation can enable quantum teleportation of the state of a single particle, atom or even a molecule. So, can we reduce a massive human into a single atom? Well, in a manner, yes. Headlines in recent years have already hinted at the technique.

Proposed by physicist Albert Einstein and Indian physicist Satyendra Nath Bose early in the last century a group of atoms (i.e., a macroscopic object) when frozen to near absolute zero suddenly take on behavior or the quantum state of a single atom, a single wave function. When reheated the sample returns to normal. Bose Einstein condensates have been created in laboratories for years. The engineering challenge of our human thought experiment would be how to quickly freeze a macroscopic object to near absolute zero without killing it and then restore it fast enough. The act of entangled teleportation is literally near instant so that is not the hurdle as long as living cells can

survive the process. But perhaps a more practical approach would be to first transport cargo or food or even simple ocean water.

Anyone that has ever moved furniture or a library of books across a country can empathize. Also, one can imagine the value of moving a lake of water above a forest fire - being super-cooled might even be a benefit! These scenarios are from technically impossible but rather become engineering problems of scale. Scale in terms of cooling and scale in terms precision i.e., isolating objects at scale to become a BEC and the scale of actual fiber optic, laser, etc. physical transport and transport fidelity.

Note how the evolution of space flight technology first involved satellites for communication and surveillance and rocket weaponry e.g., German V1 and US and Soviet ICBM tech. But that endeavor was driven to achieve those very functions first. While teleporting a bomb may gain one a tremendous threat of speed or counter-attack, if not existential fear, its benefit seems far from an immediate need or value. Thus, we can envision strives toward actual teleportation more comparable to flight tech or, better yet, the expansion of railroads. These engineering examples involved knowledge and technology that grew quickly but was driven by practical and economic value. Thus, one can envision DARPA-like initiatives motivated not to emulate Star Trek's classic Captain Kirk and his ingenious transporter engineer Scotty but rather to get thirty incredibly massive M1 Abrams tanks to Afghanistan in two minutes rather than two weeks not to mention removing all the necessary staff and logistics to coordinate fifteen C-5B Galaxy transport airlift aircraft or even longer delays with ships as an example. The benefit of the inherent logistics savings and speed will, likely backed with the scale of military funding, will likely support and invigorate the research and development to ensure the success of the technology over research by only quantum optics labs and Universities some of which focus too much on headline-grabbing efforts with living dynamic matter to gain funding, fame, publications, and tenure.

So let us re-examine large scale BEC entanglement teleportation of static matter. Consider again the use cases of water. Not only do we gain the benefit of wildfire fighting we gain the potential to fight droughts if not also a potential to dredge canals quickly - contrast versus the U.S. military's Operation Plowshare research where atomic bombs were considered for use in dredging harbors and canals. But perhaps the most important and existentially urgent benefit is along these very same lines. For scientists have speculated if pump-driven technology could be used to fight the global climate change driven rise of oceans and the decline of Greenland and Antarctica ice shelves and glaciers. The investment to simply move ocean water back to their origins could be feasible but at a scale of likely over trillions of dollars. Now consider a teleportation mechanism a mile off the coast of Antarctica or even underneath Antarctica ice, as suggested in Kim Stanley Robinson's fiction book *The Ministry of the Future*, teleporting ocean water at scale to freeze again as ice as a stop-gap to climate driven melting. Use the technology as carbon footprints and heating is slowly reduced and you have potentially bought time to save the planet.

The obvious engineering challenge becomes how to not only scale the engineering to freeze and create BECs at scale but also how to do so keeping the required generation of the required power (electricity) carbon clean or neutral. A prototype station potentially would require a nuclear reactor and its associated costs and risks to enable such a strategy, but it still becomes magnitudes of costs lower than any mechanical pump-driven solution to move billions of tons of ocean water. Much as thousands of chips, transistors, and logic gates leads to software, applications, and computation at meta-scale, consider how - at least with bulk quantities of material like water - billions of mass-produced "simple" entanglement teleporting devices (SETs) could lead eventually to other advanced technology at a meta-level in addition to the mass movement of basic atomic or molecular matter. Perhaps we alas have our equivalent to the steam engine to open the dawn of Eric Drexler's nano-technology driven age of "radical abundance."

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