

## Interstellar Challenge Matrix (ICM)

<b>Propulsion Mechanism</b>	<b>Legal?</b>	<b>Relatively Safe?</b>	<b>Economic/Commercial Viability?</b>	<b>Theoretical-Empirical Relationship?</b>	<b>Technological Feasibility?</b>
Conventional Fuel Rockets:	Yes	Yes, but susceptible to human error.	No. Greater than US\$1.19E+14	Known. Theoretical foundations are based on Engineering Feasible Theories, and has been evolving since Robert Goddard invented the first liquid-fueled rocket in 1926.	Old technology. Commoditization.
Antimatter Propulsion:	Do Not Know.	No. Extensive gamma ray production. Issue is how does one protect the Earth? Capable of an End of Humanity (EOH) event.	No. Between US\$1.25E+20 and US\$6.25E+21	Dependent on a Millennium Theories. John Eades states in no uncertain terms that antimatter is impossible to handle and create.	Impossible (John Eades)
Atomic Bomb Pulse Detonation:	Illegal. This technology was illegal as of 1963 per Partial Test Ban Treaty	No, because one needs to be able to manage between 300,000 and 30,000,000 atomic bombs per trip.	No. \$1.0E+10 per bomb. Given less than 1/6 of the useful energy is transferred to propulsion it is likely to require 10 bombs at the very least, with no guarantee that this will reach 0.1c. Therefore total cost is on the order of \$1.0E+12.	Known and based on Engineering Feasible Theories	Need to get the international community to over turn the Partial Test Ban Treaty of 1963.
Time Travel:	Do Not Know.	Do Not Know. Depends on how safely exotic matter can be contained.	No. Requires Exotic Matter, therefore greater than US\$1.25E+20	Dependent on a Millennium Theory. Exotic matter hypotheses are untested. No experimental evidence to show that Nature allows for a breakdown in causality.	Not possible as exotic matter results in perpetual motion physics.
String Quantum Foam Based Propulsion:	Do Not Know.	Do Not Know. Depends on how safely exotic matter can be contained.	No. Requires Exotic Matter, therefore greater than US\$1.25E+20	Dependent on a Millennium Theory. String theoreis have not been experimentally verified. Exotic matter hypotheses are untested. Existance of Quantum Foam now suspect (Robert Nemiroff)	Not possible as exotic matter results in perpetual motion physics.
Small Black Hole Propulsion:	Most Probably Illegal in the Future	No. Capable of an End Of Humanity (EOH) event	No. Using CERN to estimate. At least \$9E+9 per annual budget & >\$5E+9 for equipment. CERN was founded 58 years ago in 1954. Therefore a guesstimate of the total expenditure required to reach its current technological standing is \$1.4E11.	Don't know if small black holes really do exist in Nature. Their theoretical basis should be considered a Millennium Theory.	Unable to experimentally confirm any technology capable of controlling small black holes