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SPACE PROPULSION SYMPOSIUM (C4)  
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## FUNDAMENTAL ENERGY PROPULSION SYSTEMS

**Abstract**

With the world reaching higher rates of carbon emission every minute resulting in the melting of our polar caps, climate change and various effects on our environment, focusing on decreasing our carbon footprint is imperative. The space chase is growing worldwide with humans looking strongly ahead at the advantages this may bring our race. But we have been blinded by our curious nature not realizing the serious consequences that will come from soot emissions from rockets in the future. Black carbon, also known as soot, which is emitted by hydrocarbonfuelled rockets are being emitted into our atmosphere in places where it would rather not have been. Having these particles with their long lifetimes stuck in the stratosphere for years, accumulation resulting in negative circumstances for earth's climate is inevitable. Having no method of removal for these and constantly launching rockets releasing these compounds will result in highly adverse effects for the climate of the earth. Thus it is of utmost importance to explore new ways of rocket propulsion. We must explore the usage of other fundamental energies of nature to jointly achieve the propulsion of rockets. We have considered classic rocket fuel, hybrids and even electric, in the form of ion propulsion. But why have we not considered magnetism, one of the most powerful fundamental energies? Some may argue that the carbon footprint is low via the usage of liquid hydrogen but this is a great misconception. Realistically to produce roughly one kilogram of liquid hydrogen will require approximately 15 kilowatt hours of electricity, where this electricity itself is usually produced by a coal powered plant. Knowing that an average shuttle carries 113 tons of liquid hydrogen makes the realization of the problem crystal clear. Magnetism on the other hand is free of any form of emission of chemicals or energies that may negatively affect our environment on such a scale. Realizing the power of magnetism in usage of super conductors we have created high speed trains reaching tremendous speeds of up to 500km/h. To harness this mannerism of energy within one of the stages of a rocket is to essentially decrease the carbon footprint left by rockets. The growth of the space community is directly proportional to the amount of rockets produced, it is therefore prudent, and in fact our responsibility as innovative scientists, to explore environmentally friendly ways of achieving our goals.