

November 18, 2020
MSE 2101 topics

- Off to the stars – literally!
- Pioneer 10
 - launch in 1976
 - 21 months to Jupiter
 - 115,000 years to Proxima?
 - ~2 million years near Aldebaran?
 - the plaque
- Pioneer 11, Voyager 1, Voyager 2, New Horizons – same fate
- An obvious solution?
- How much energy would we need?
 - what does the amount of energy depend on?
 - world's current annual energy use: $\sim 5 \times 10^{20}$ J.
 - ~18 tons per passenger, 5000 passengers: ~0.1 million tons
 - aim for 10% of the speed of light: 4.5×10^{22} J.
 - two Centuries worth of energy!!!
- Is it even possible to use existing rockets?
 - how do rockets work anyway?
 - crucial parameter: the mass ratio
 - nuclear rockets? Projects Rover and Orion
 - ion propulsion? Sunlight? Lasers?
 - interstellar arks? Hybernation or generations of people?
 - matter-antimatter rocketry? Fuel scoops?
- ... and then there's relativity – for better or worse?