



Space Solar Power 100 years

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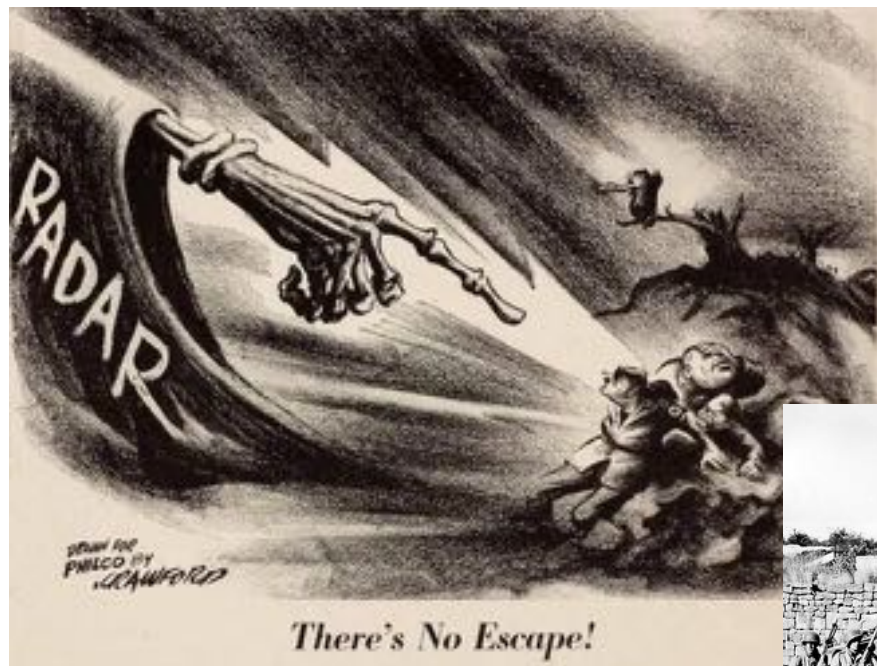
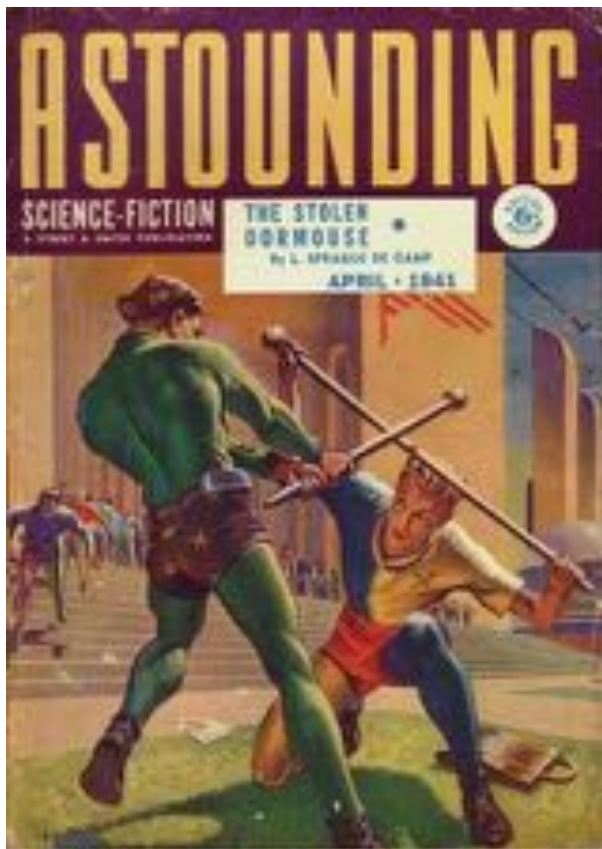
Outline

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1940s



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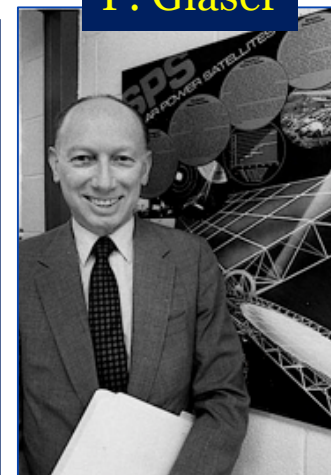




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1950s-1960s

P. Glaser



W. Brown



22 November 1968, Volume 162, Number 3856

SCIENCE

Power from the Sun: Its Future

Peter E. Glaser

There are three major energy sources available to us today: fossil fuels, nuclear energy, and solar energy. Among these, solar energy is basic to man's continued survival on earth. Although all life would cease should there be a decline in the radiation the earth receives from the sun, solar energy as a significant source of power has not been utilized.

We have been fortunate in that our reserves of fossil fuels have been sufficient to power the machine essential to start modern man on the upward spiral of technological progress. Because we have coal, oil, and natural gas, the tremendous potential of solar energy has not yet been harnessed.

Whether or not the human species will continue to expand could depend on our ability to develop alternative energy sources. Figure 1 shows the transitory nature of the energy which we will be able to derive from fossil fuels (1). We can gain a better perspective by considering the annual consumption of energy from fossil fuels in recent history. Fossil fuels represent a finite reserve; the estimated width of the "fossil-fuel impulse function" is only a few hundred years. The decline in the usefulness of fossil fuels will occur when their availability has dropped to around 10 percent of the peak value. The precise location of this point is unimportant; what is important is recognition that the pulse width is a few hundred years, not thousands of years (2).

22 NOVEMBER 1968

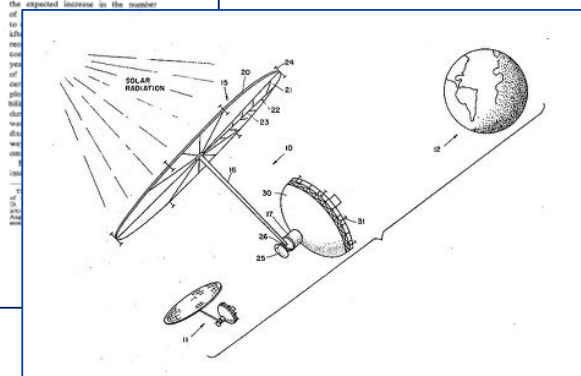
Energy Resources

In Fig. 2 the estimated energy consumption for the United States is projected to the year 2200. By that date, the projection indicates, approximately 30 percent of the total power requirements will have to be met by energy sources other than those available today (3). This requirement for new sources represents a decline: energy deficiency, which within that time span may well become worldwide. Evolutionary processes and technological progress will tend to hasten the use of nuclear power, and this will reduce our dependence on fossil-fuel reserves for a time. Should present obstacles in the development of fusion-generated power be removed, our energy requirements may, it appears, be met. However, the control of fusion is still the physicist's dream. It is expected that new physical principles will have to be discovered and huge plants built before useful power from this source can become available to us. To meet the projected power demands, several major obstacles will have to be overcome, and the disadvantages of power-generating processes we are now considering will have to be reduced or offset.

Control of the environmental deterioration that results from our efforts to meet the increasing demands for power from available energy sources will be increasingly more difficult and more costly. Air pollution and water pollution already plague us; in addition,

thermal pollution from nuclear power plants could threaten rivers and lakes in heavily populated areas. The need to control this source of pollution has been recognized, and the use of cooling towers may partially solve this problem. But substantial costs would be involved; utility companies may have to spend \$2 billion for cooling towers and related equipment in the next 13 years, in addition to the basic \$10 billion investment they expect to make in nuclear power plants (4). Estimates for U.S. investment in electric-power-generating plants of all types over the next 20 years range up to \$100 billion. (When the investments for environmental control are extrapolated over 30 to 50 years, we can see that our major concerns will be alternative approaches, to reduce the cost of controlling undesirable effects on our environment.)

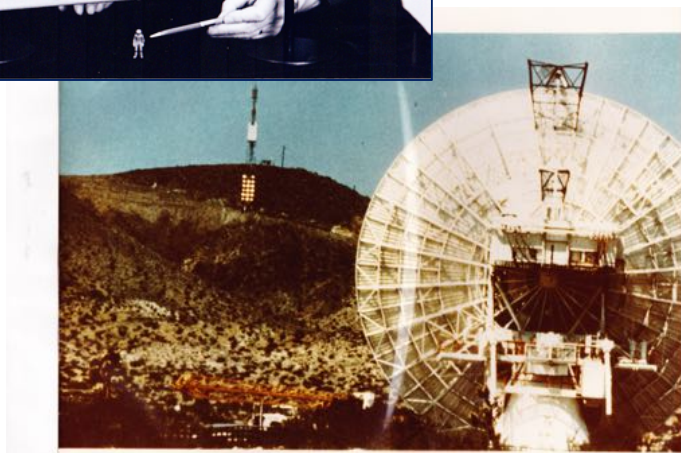
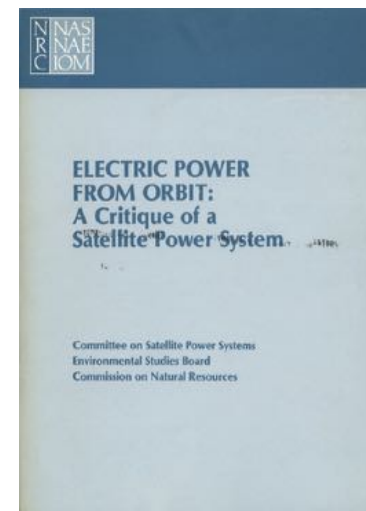
One other factor that emerges in a consideration of the increasing per capita consumption of energy is the shift in the kind of fuel consumed. Wood fuel was the dominant source of energy up to 1850; by 1910, coal accounted for 75 percent of the total energy consumption, and by 1960 natural gas and oil represented about 65 percent of the total. It is likely that the expected increase in the number



1970s-1980s



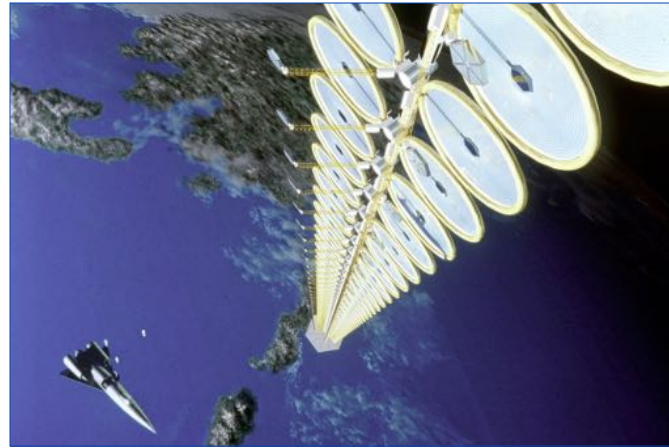
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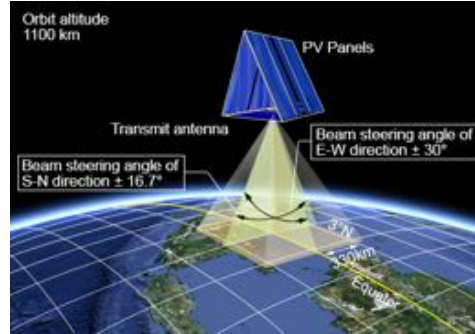
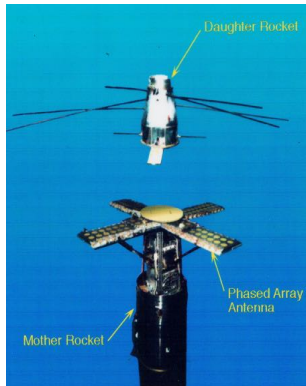
1990s-2000s



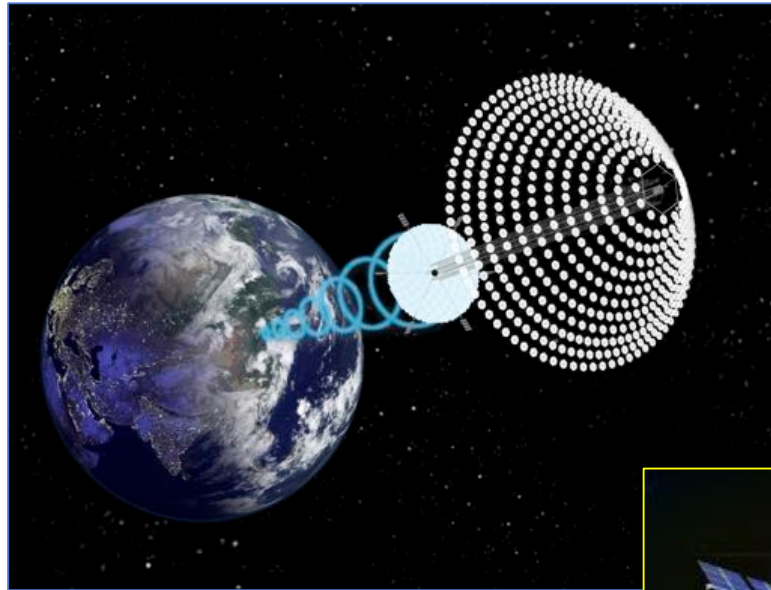
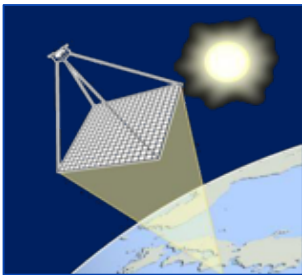
A. Kalam



Wang Xiji



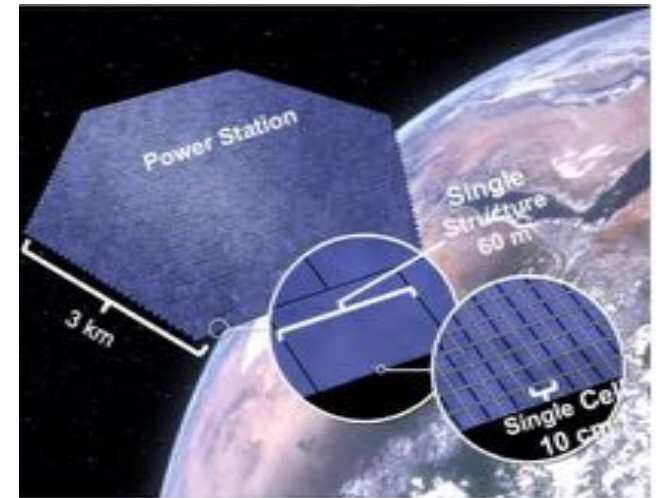
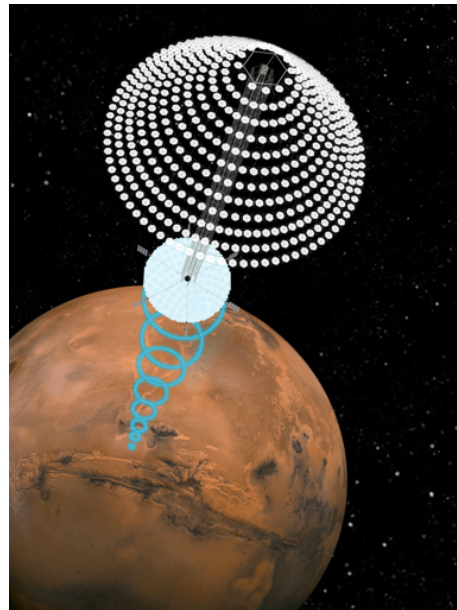
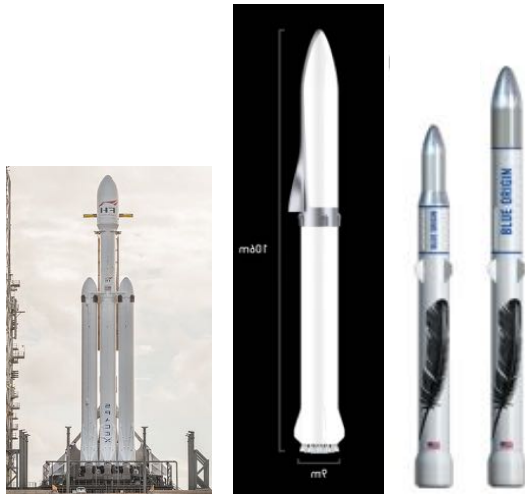
2010 +/-



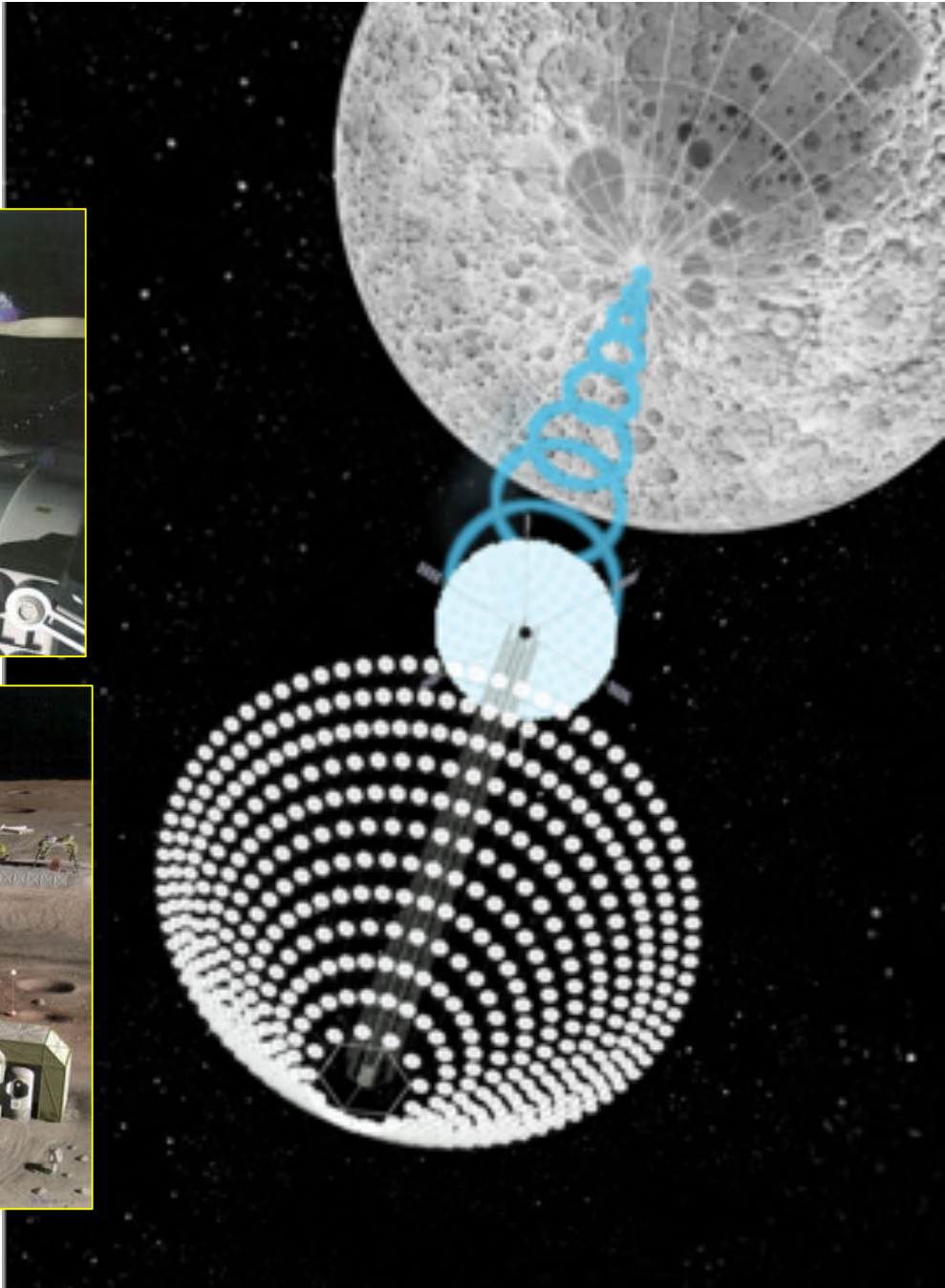
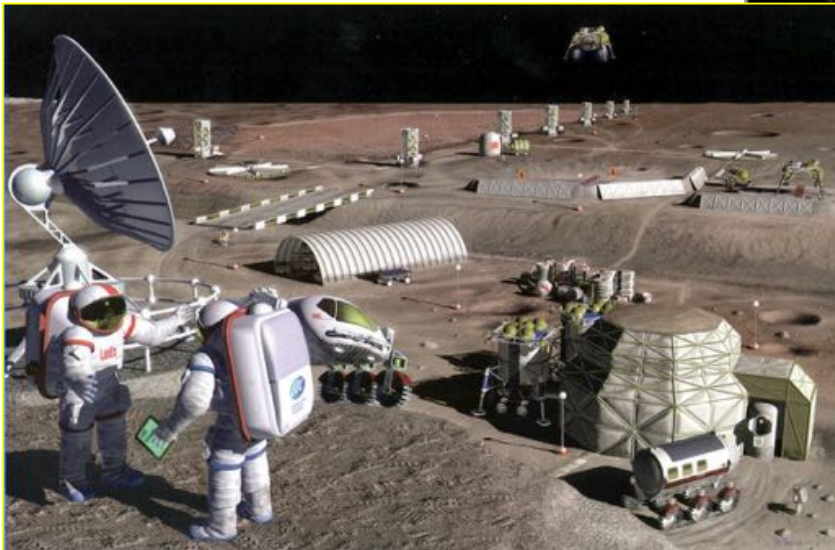
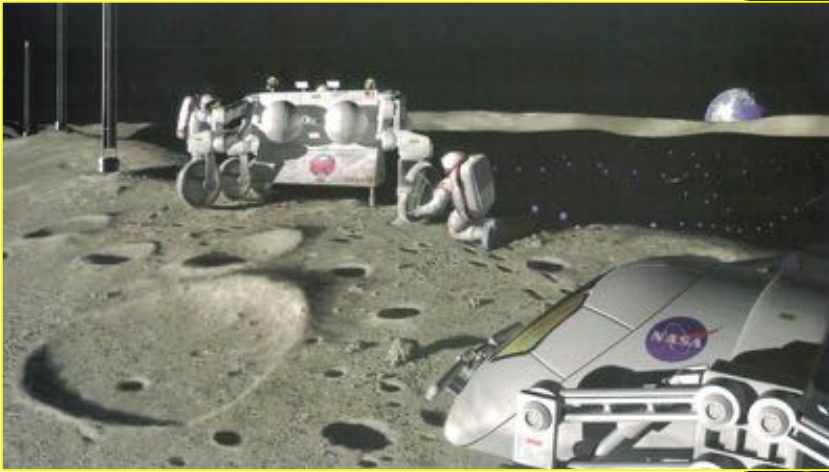
2010 +/- New Circumstances

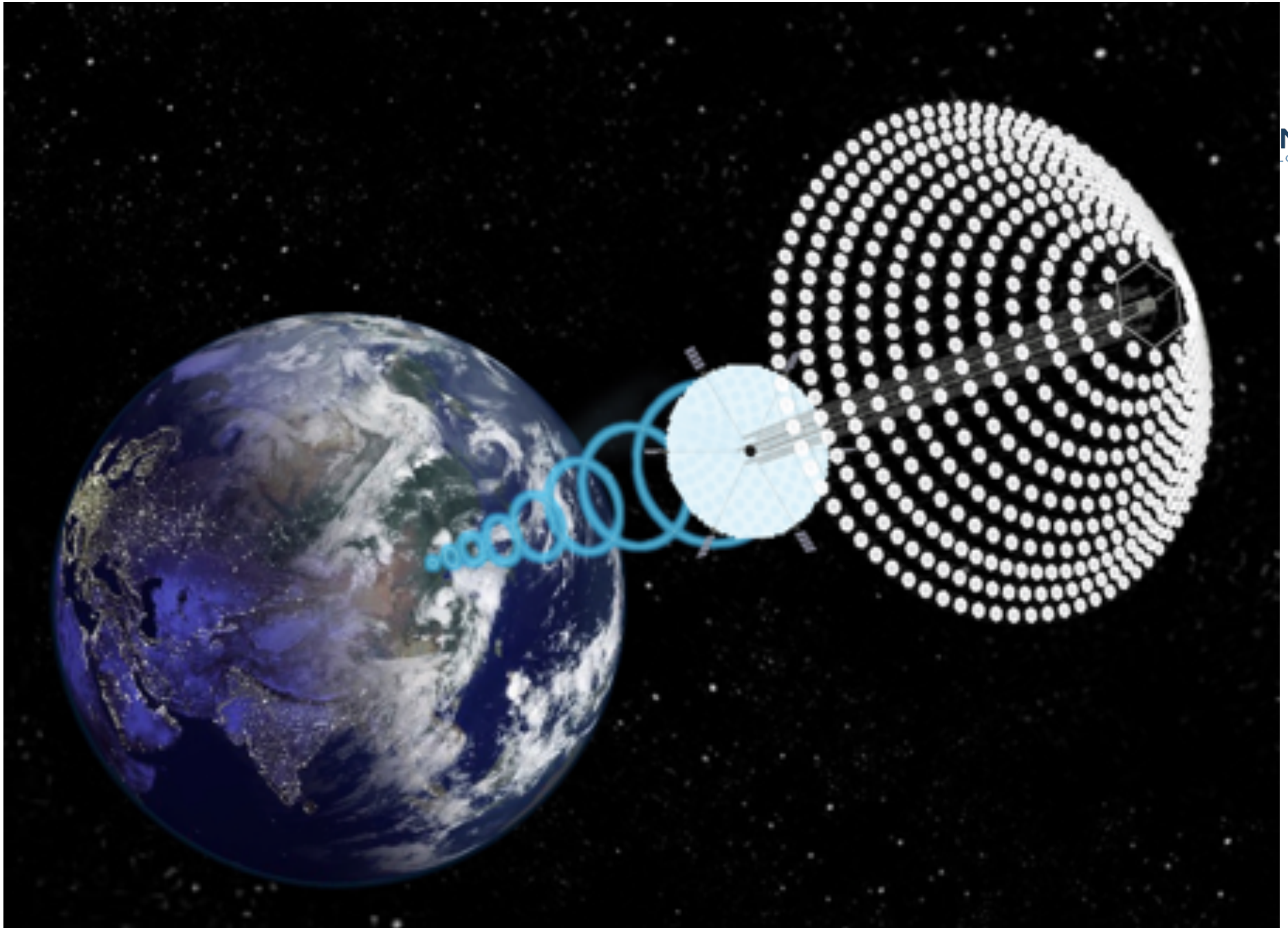


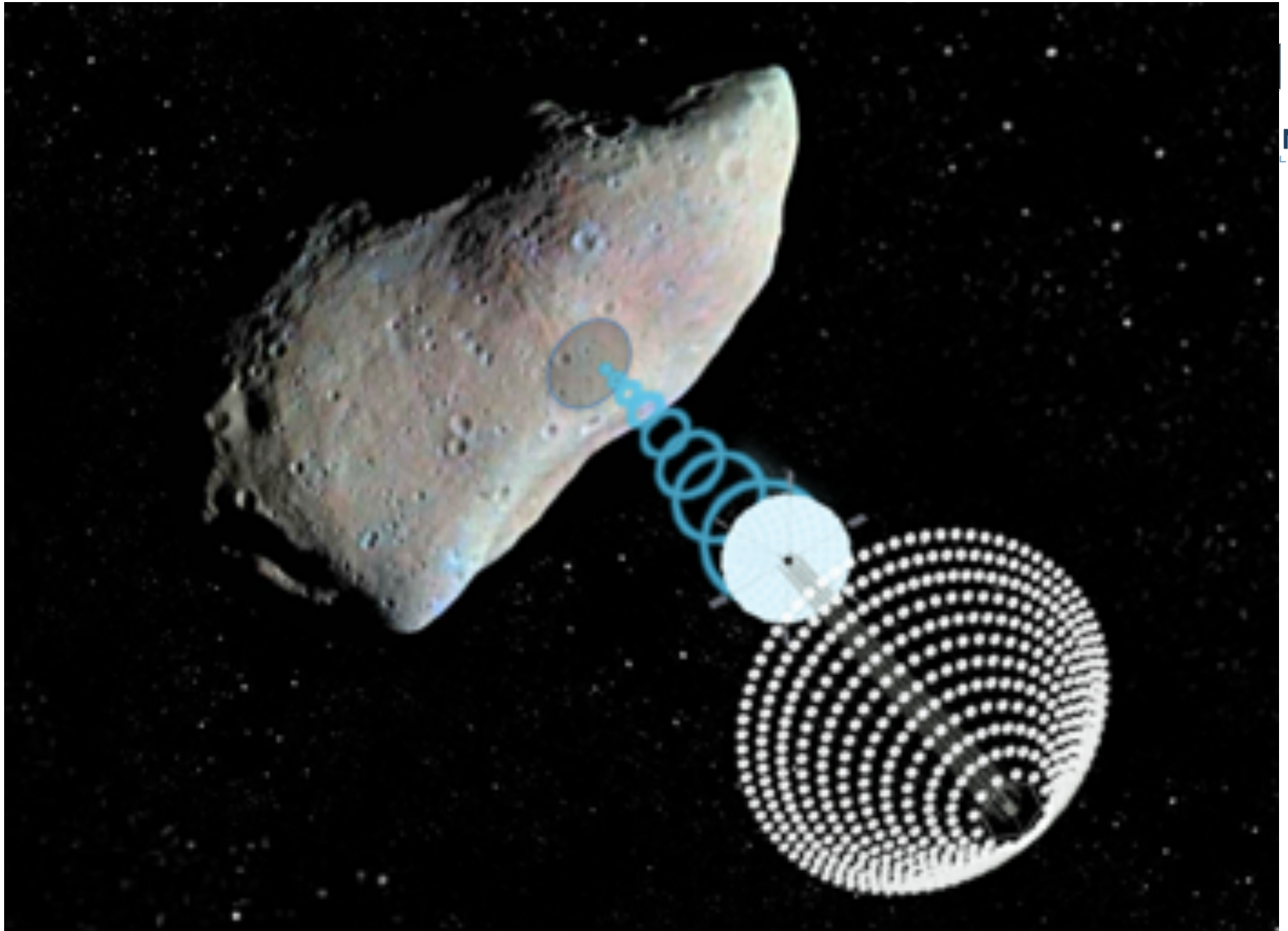
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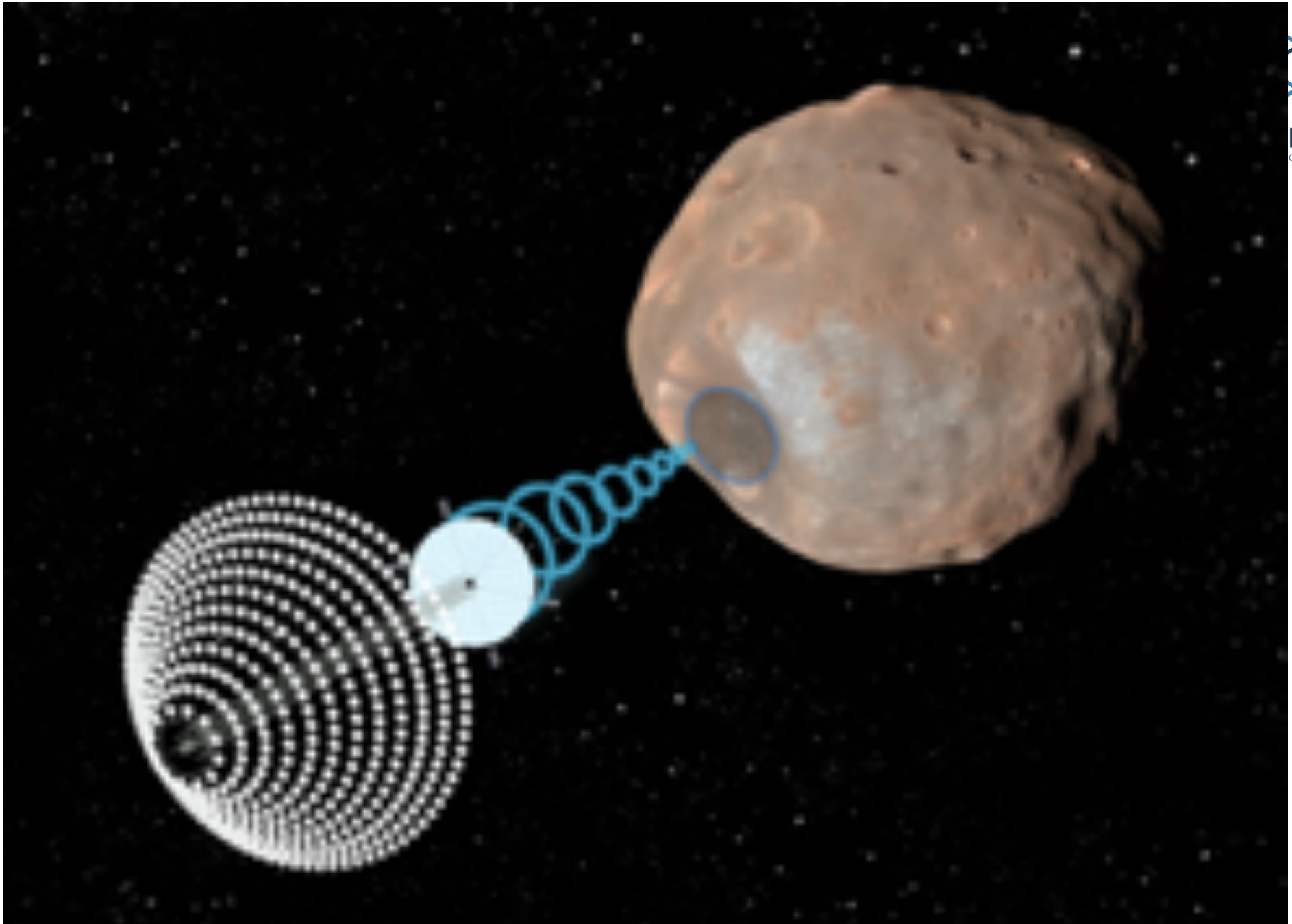


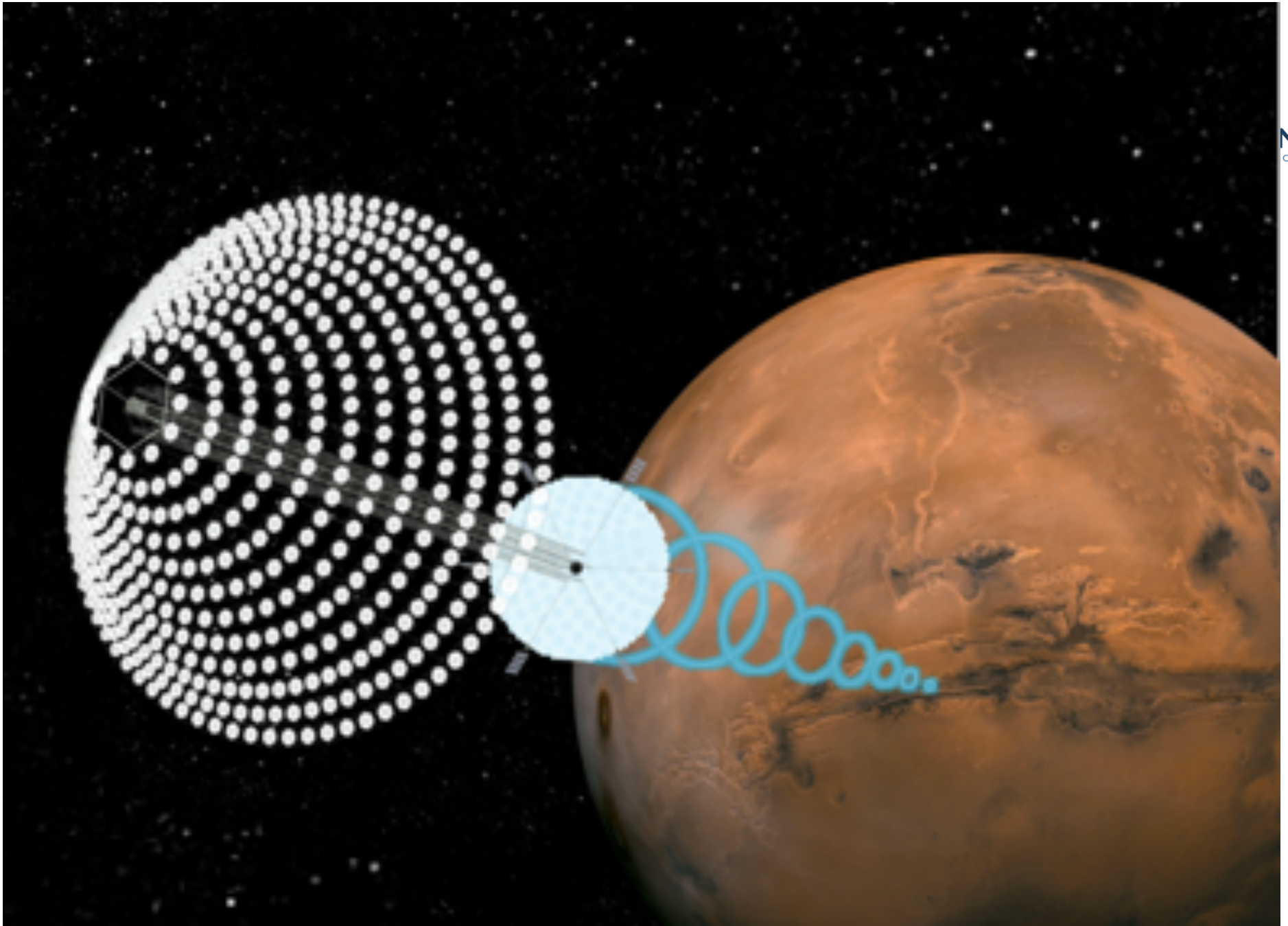
The Future











The Far Future...

Space Solar Power ...

*The Next 100 Years are Coming
And (perhaps) faster than you think...*

The Case for Space Solar Power

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