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Tourists' Guide to Mars

Volume 1

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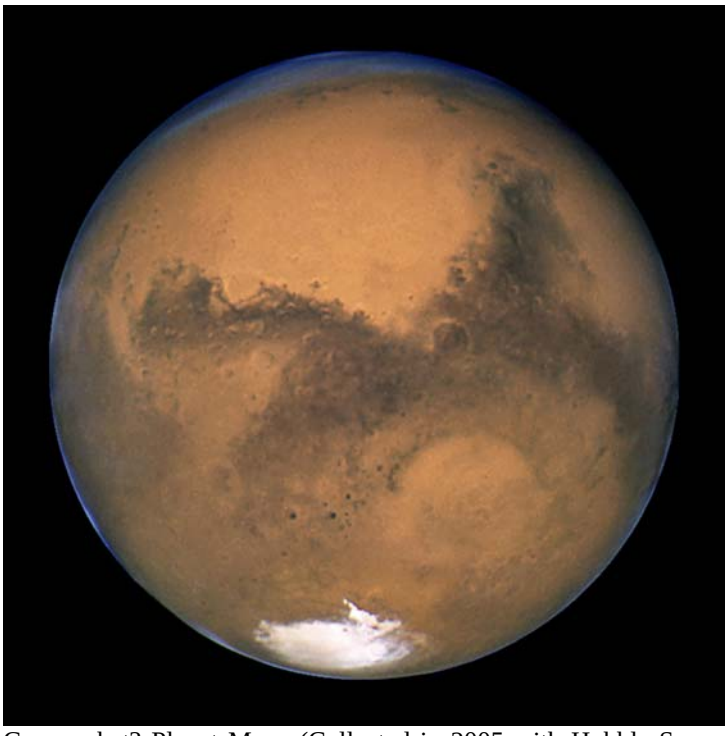
Tourists’

Guide to Mars

A Scientific Perspective in a Nutshell

- **Is there a chance for a successful crewed Mars program within the next decade?**
- **Will the technology for that ever be developed?**
- **Does that technology already exist?**
- **What about propulsion systems?**
- **Do we need warp drive for that?**
- **What about life support?**
- **How to fly without air?**
- **Orbital mechanics: What is that?**
- **Changing orbits and whatnot: How does that work?**
- **What is the current state of space flight technology?**
- **What are the strategies for a Mars trip?**
- **How long would that trip take, by the way?**
- **Costs?**
- **When do we make it to Mars?**

- **What if NASA, ESA don't ever try?**
- **Non-government space flight?**
- **Space tourism today.**
- **Artificial gravity.**
- **Making O_2 on Mars.**
- **1000 mission plans exist, no kidding.**



Guess what? Planet Mars. (Collected in 2005 with Hubble Space Telescope). Darker regions are due to a dust storm in the equatorial region. Image credit: NASA, ref.[1]

List of Contents

Part III – Basics - How Spaceships Fly

➔ That's a little heavy on the physics end, yes, I know, but it would be good to know that stuff and it is all written for non-scientists with some memory about high school science.

Included are: Basic Newton Dynamics; Orbital Mechanics; Gravitation; Gravitational Maps; Orbits & Centrifugal Force; Orbital Paradox; Orbital Energy; Orbital Paradox II; Orbital Energy vs. Shape; Escape Speed; How to Launch in the First Place?; Elliptical Orbit vs. Hyperbolic Escape; Again, Here is Your Guide …; Sphere of Influence & Patched Conics; Why Launching at The Equator?; More Space Flight Jargon; Orbits/LEO; Geostationary; What is Δv?; Step on Gas Twice; Minimum Fuel Transfer – greetings from Hohmann; Front or Back Thrusters?; Rendezvous part I; Devil in Details; Aero-brakes, Aero-capture; Direct Entry; Flyby, Slingshot Effects, Venus swing-by, Gravity Assist; Rendezvous II – Capture Orbit; So What?; Lagrange Points; Lagrange Points Viewed Differently; Why do Astronauts Float?; Kepler's Laws

Appendix – Nitty Gritty Details

➔ Besides the transportation issue, I am afraid, traveling to Mars comes with a number of concerns some of which are briefly summarized here

Included are: Life Support; Closed-Loop Systems; Breathing Gas; Making Oxygen on Mars in 2020; More Chemistry on Mars; Making Water on Mars; Making Fuel on Mars; NASA's in-situ Resource Utilization; Terraforming – Settlement; Turn up the Heat; Shields up; Propulsion; Artificial Gravity; Communication & Navigation; Surface communication; In flight communication; Navigation; Costs; Why Mars?; Why should we leave?; Becoming a NASA Astronaut?; Couch Potato Astronauts

References & Notes

There is a 2nd (non-print) appendix to this travel guide available for a free download at www.LatheCity.com It includes mostly web links. Similarly, the reference list to this guide can be downloaded in different formats including clickable links. For further free resources go to http://www.lathecity.com/Books/Mars/ or http://www.lathecity.com/Books/Mars/Tourists_Guide_to_Mars.html

Disclaimer

I am a physicist, yes, with a nice PhD, but I do not hold degrees in aerospace engineering, astronautics, Newton dynamics, or something. Also, I cannot verify information provided by private space companies nor government organizations. I am not employed or by any means associated with any of them. I am not a member of any Mars club either (, yet). Thus, before you fly, double check your transfer orbits. If you end up at Venus but not Mars, don't blame me.

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Front cover Image Credit: NASA, 1999, Artist's concept of Antimatter propulsion system (NIX #: 9906272 MSFC-9906272), ref.[4]

About the Author

The author is a physical chemist, a surface chemist, and since 2003 a faculty member at a US college. Born in West-Berlin, he got most of his education in Physics in Germany. After many years of postdoc positions (Italy, USA, Italy, Germany) and a habilitation in Germany (German tenure), he found a faculty position in the US where he obtained tenure in 2009. Although this book project has nothing to do with the university he is employed, more one could find here www.uweburghaus.us He has written several books, (most of these about practical engineering topics), and sells most of those books in the meanwhile by myself, i.e., he owns a part time small business. Details are here: www.LatheCity.com. LatheCity is actually specialized in manufacturing tools for benchtop metal work systems.

1. http://imgsrc.hubblesite.org/hu/db/images/hs-2005-34-j-large_web.jpg (5/15/16)
   Credit: NASA, ESA, and The Hubble Heritage Team (STScI/AURA)
2. http://www.jpl.nasa.gov/imagepolicy/
3. https://www.flickr.com/photos/spacex/26239020092/ (4/29/16)
   https://www.flickr.com/people/130608600@N05 (copyright info)
4. https://mix.msfc.nasa.gov/abstracts.php?p=577 (5/15/16)
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