Return To the Moon

Spots collide on Jupiter!
Mars in 39 Days
Europa
Universe for Disadvantaged Children

The Drake Equation
Contents

News our speciality

6 News in Brief
- Venus Express Reaches Final Orbit
- Fear Not Gamma Ray Bursts
- Milky Way Has New Neighbours
- Closest Supermassive Black Holes Found
- ESA's ExoMars Rover Unveiled
- Space Shuttle Discovery Prepares to Launch

8 Earth to Mars in 39 Days?

9 Crumbling Comet Calamity in 2022?

9 Triton's Mysterious Orbit Explained

10 Huge new red spot to collide with Jupiter's Great Red Spot

12 Astro Anniversaries

Features

28 Return to the Moon
Martin Houston writes on the various international projects for the Moon.

31 Europa
Joe Knight explores this fascinating Jovian moon

36 Capturing the Universe for Disadvantaged Children
Sean McCabe describes this worthy project to help inspire less fortunate children

37 The Drake Equation
Joe Knight explores the value of this famous equation

Sky Diary

22 A guide for the naked eye, binocular and telescope owners.
Compiled by David Grennan

Regulars

4 Editorial
Kevin Sheahan

5 Letters
Questions, Comments & Opinions

11 What's Happening on the International Space Station?
Kevin Sheahan brings us the latest from the I.S.S.

14 Hubble Space Telescope
Hubble Space Telescope's 16th Birthday!
by Tony Ryan

16 Book Reviews
Gerard Mc Mahon reviews
Flashes of Brilliance
the cutting edge of Irish science.
By Dick Ashstrom
Dr Neil English reviews
Visual Astronomy Under Dark Skies
by Antony Cooke

18 Everything You Always Wanted To Know About Astronomy But Were Afraid To Ask
Denton P. Walter asks "Who Did Invent The Telescope?"

34 Young Astronomer's Page
Amazing facts, Drawing, Competition, Jokes, and an astro-crossword for our younger readers by Amy Farrar A.I. Junior Section

38 Observer's Log
A summary of your observations.
Compiled by Kevin Sheahan.

40 Reader's Gallery
Keep sending your own shots in to us

44 Society News
- Archeoastronomical Discoveries
- July Lecture
- Astronomical Imaging With a CCD Camera
- Tom's Column No. 35
- Star-B-Q April 28 in Roundwood
- Astronomy Ireland Events 2006
News

Earth to Mars in 39 Days?

Research carried out by University College Dublin in conjunction with the Ad Astra Rocket Company of Houston is aimed at reducing flight time to Mars from two years to a mere 39 days. The plan is to develop a new type of rocket, powered by plasma that reaches temperatures of 100,000 degrees to replace the chemical rockets now in use. The collaboration is being carried out through the FAS Science Challenge Intern programme, which has resulted in 20 students, including four apprentices, being placed in US universities and firms in the current academic year.

A PhD student from UCD's School of Electrical, Electronic and Mechanical Engineering, James Mulcahy, has spent several months on an internship with Ad Astra engineers in Houston to carry out environmental research on a prototype engine there. James is originally from Cork, but has lived in Drogheda for the last 10 years. He is currently working on the Variable Specific Impulse Magnetoplasma Rocket (VASIMR). VASIMR is an ion, or plasma rocket, that works by heating a gas to extremely high temperatures, to strip the electrons from the gas, allowing the heavier nuclei to be propelled out of the rockets exhaust by magnetism. James explained the working of the rocket to me in an email last May –

"The VASIMR concept is significantly different from a conventional rocket. Chemical rockets use a fuel to provide the energy for thrust and as the expulsion mass to drive the rocket. The VASIMR uses a neutral gas only as an expulsion mass or propellant; the power comes from another source and is applied by radio frequency electromagnetic waves to the propellant.

Neutral gas is fed into a chamber. The gas is converted into a plasma by energising it with an antenna that emits high power radio waves. To prevent the plasma touching the surrounding material structures of the engine, which would cause erosion and power loss from the plasma, it is confined using magnetic fields, which cause the electrons and ions to move in a constrained spiral along the axis of the rocket. Further upstream the plasma is passed under another radio frequency antenna. This is tuned to the resonance frequency of the ions in the plasma and heats it up even more. The plasma is then exhausted through a magnetic nozzle. This converts the thermal energy of the plasma into kinetic energy that creates the rocket thrust.

Unlike a chemical rocket which fires for a short period then shuts down when it reaches top speed, the VASIMR can fire continuously and reach much higher velocities. The 39-day trip to Mars is based on a calculation that assumed a 200MW power supply and a 20 tonne payload. For the moment this is a big assumption, as it requires a nuclear reactor in space. However this is a development that will be necessary to overcome the limitations of chemical rockets.

My involvement is in the thermal side. The VASIMR will use superconducting magnets to constrain the plasma. These need to operate at cryogenic (very low) temperatures to sustain the magnetic fields required. The generation of the plasma requires a lot of heat. I'm involved with a team who are attempting to engineer ways of dealing with that heat, in order to come up with a final working design."

By reducing the transit time to Mars, the cost of missions could be greatly reduced, while their frequency could be increased. But long before that, the FAS initiative will bring great benefits to Irish science.

"This FAS initiative is a fantastic opportunity to train Irish graduates in a space technology environment," said David Browne, senior lecturer at UCD who is leading the collaboration project with Ad Astra. "It provides us with an opportunity to apply our engineering expertise at the highest international level, and to learn a lot along the way," he said.