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9-1-2023

The Moon: The Future Home for Mankind

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Recommended Citation

Losarcos, Juan Manuel, "The Moon: The Future Home for Mankind" (2023). *International Programs*. 240. <https://surface.syr.edu/eli/240>

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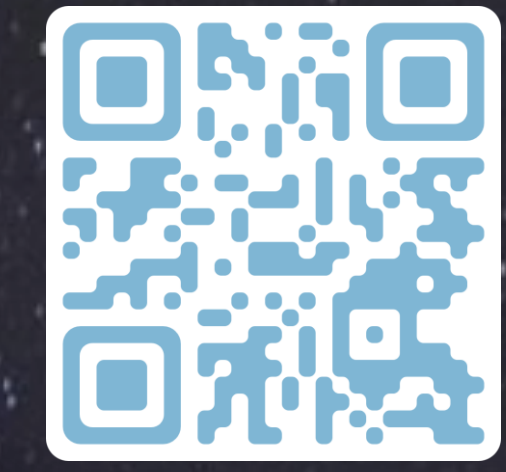
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The Moon: The Future Home for Mankind

by Juan Manuel Losarcos

References



Abstract

Space exploration has expanded rapidly in recent years, with Mars being a primary focus. The Moon has gained significance as a potential stopover for space travel. Studies suggest that lunar lava tubes can provide safe havens from space environmental factors (Bessone *et al.*, 2020). **Spacebee Technologies** won the "Open Space" moon rover design challenge with their mini rover concept, "RoverTito," aimed at detecting lunar lava tubes using geophysical instruments.

Introduction

The future of space travel faces challenges due to the **extreme temperatures (-300°F to 260°F)**, **meteorite impacts**, and high **radiation levels** (2 Sv per day) on the lunar surface, making the establishment of human settlements difficult (Fig. 1). However, lunar lava tubes have been proposed as natural shelters. These are empty pipe-like structures formed by cooling lava flow (Haruyama *et al.*, 2012).

Method

The research methodology involves an extensive literature review on the environment and an Accelerometer test that was conducted in Argentina to evaluate its potential for detecting lunar lava tubes.

Results

Gravimetric anomalies detected by GRAIL mission probe the presence of lunar lava tubes with dimensions of hundreds of meters, often appearing as semi-circles or circles (Theinat *et al.*, 2018). Moreover, these tubes offer **stable temperatures near -4°F**, **minimal radiation**, and **meteor shower effects**, making them suitable for lunar colonization (Fig. 2) (Haruyama *et al.*, 2012).

Spacebee Technologies is developing an ultra-lightweight moon rover (Fig. 3) equipped with accelerometers and GPR to detect lunar lava tubes non-invasively. Preliminary tests on analogous structures in Argentina demonstrated the potential of using accelerometers to detect subsurface voids by analyzing natural vibrations of the moon (Fig. 4).

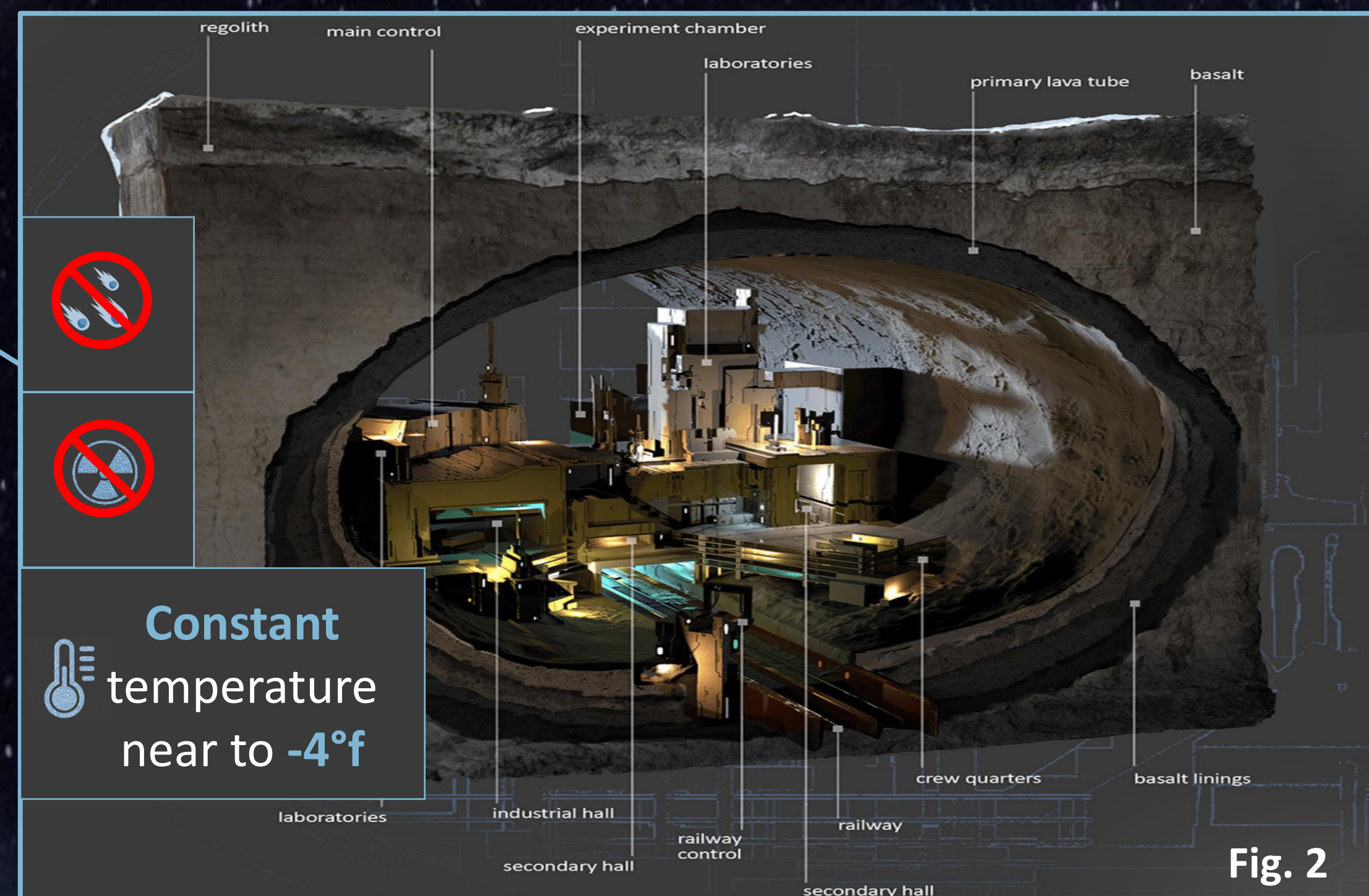


Fig. 2



Fig. 3

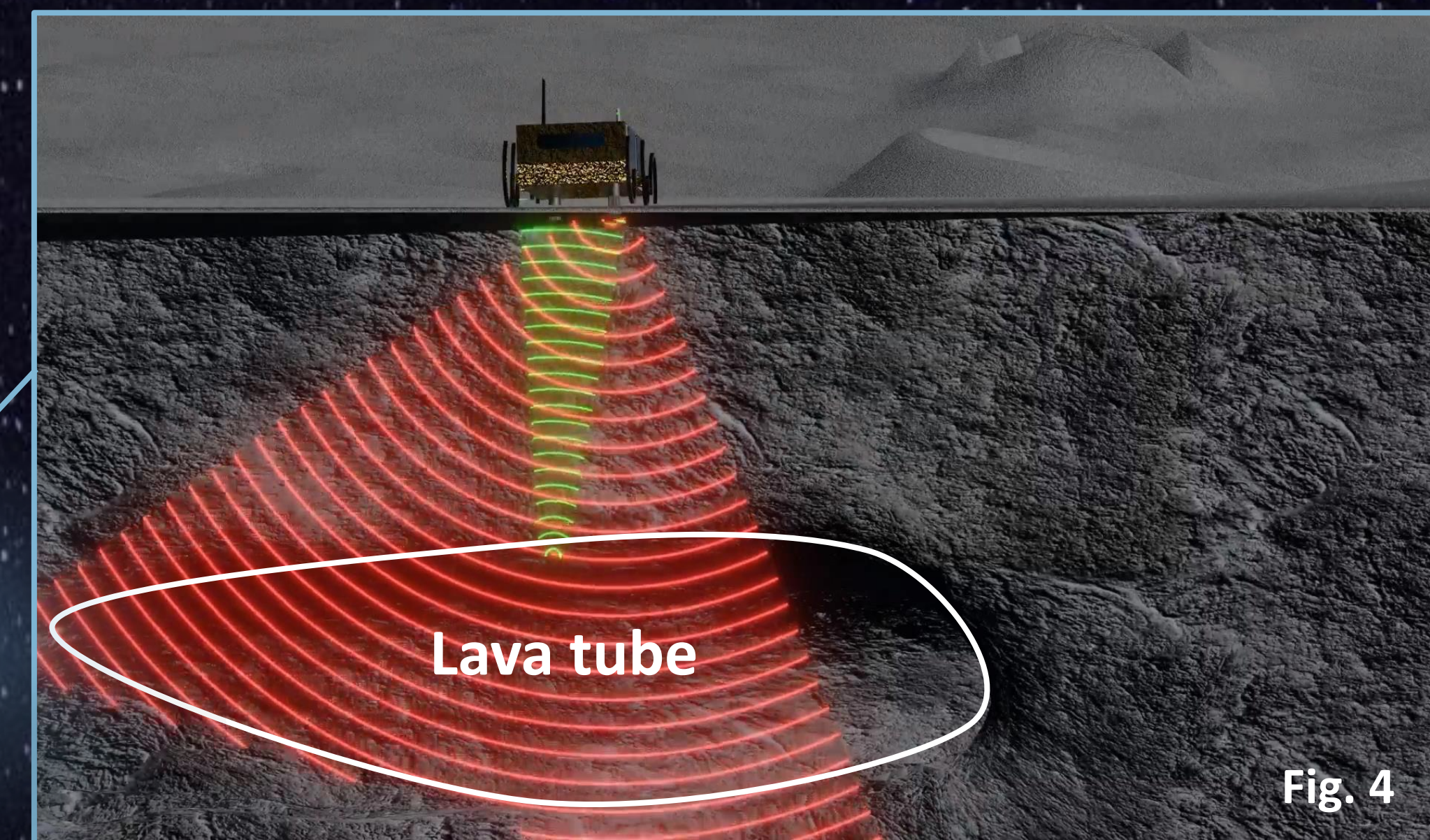


Fig. 4

Conclusion

Lunar lava tubes hold great potential as safe havens for future human settlements and refueling stations on the way to Mars. Spacebee Technologies' mini rover, is a promising tool for detecting these tubes non-invasively. These findings highlight the significance of lunar resources in advancing space exploration and support the vision of establishing a sustainable human presence in the universe.