

57th IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE  
ACTIVITIES (D5)

Interactive Presentations - 57th IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE  
MANAGEMENT IN SPACE ACTIVITIES (IPB)

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QUANTUM TECHNOLOGIES FOR SAFE SPACE COMMUNICATION

**Abstract**

In an era where space missions are increasingly vulnerable to cyber-based security threats, the integration of quantum technologies offers a promising solution to establish secure communication channels for space-based systems. This paper investigates the application of quantum technologies, particularly Quantum Key Distribution (QKD), to ensure the safety and integrity of space communication.

As a member of the Association, which specializes in both space exploration and quantum technologies, this topic holds particular significance for our organization. Our research aims to explore the feasibility and effectiveness of utilizing QKD in space communication systems to mitigate the risks posed by cyber threats.

Through a comprehensive analysis, this paper examines the principles of QKD and its potential applications in space-based communication networks. We investigate the challenges and opportunities associated with implementing QKD in the space domain, considering factors such as quantum resource limitations, compatibility with existing infrastructure, and resilience against adversarial attacks.

Furthermore, our research focuses on proposing innovative solutions and strategies to overcome these challenges and harness the full potential of quantum technologies for safe space communication. By leveraging insights from both the space and quantum technology domains, we aim to contribute to the development of robust and resilient communication architectures for future space missions.

This paper serves as a call to action for collaboration and exploration in the field of quantum technologies for space communication. By bridging the gap between theory and practice, we can unlock new frontiers in secure and reliable space communication, ensuring the continued advancement of space exploration and scientific discovery.