The text discusses the pros and cons of using silicon carbide (SiC) versus tungsten for the divertor in the DIII-D tokamak, emphasizing a preference for novel research approaches.

Need for Unique Research:

- DIII-D should explore unique wall materials to provide new perspectives and avoid replicating existing research on tungsten divertors.

Heat Flux Capabilities:

- SiC can handle heat flux nearly as well as tungsten without the melting issues or core contamination associated with tungsten.

Current Use of Tungsten:

- Tungsten divertors are common in other machines, making additional tungsten studies less interesting from a plasma-material interaction (PMI) perspective.
- Tungsten is well-studied (e.g., ASDEX-U), and further testing on DIII-D would not offer new insights.

Liquid Metals:

- Liquid metals have potential but present significant technological challenges and maintenance issues.

Advantages of SiC:

- SiC offers high heat flux tolerance, low sputtering, and low neutron damage, making it a reactor-relevant material.
- SiC has not yet been tested as a divertor material, presenting an opportunity for novel research.
- SiC's high emissivity and low reflectivity enhance diagnostic clarity.

Challenges with Tungsten:

- High-Z materials like tungsten can cause excessive sputtering and core radiation at certain temperatures, limiting operational space.
- Tungsten is already extensively researched in other machines, reducing the novelty and relevance of additional tungsten studies on DIII-D.

Scientific and Practical Considerations:

- DIII-D should focus on novel materials like SiC to complement existing research and provide valuable new data.
- SiC could facilitate high-performance scenarios and differentiate DIII-D from other devices.

- Liquid metal options are interesting but less practical due to operational challenges.
- The use of tungsten in DIII-D would duplicate existing research and may negatively impact performance.
- DIII-D's unique characteristics make it an ideal candidate for testing new materials like SiC.

Conclusion:

- Silicon carbide is favored over tungsten for DIII-D's divertor due to its potential for novel research and reactor relevance.
- Liquid metal, while promising, is deemed less suitable for large-scale implementation.
- Tungsten, despite its known benefits, is less favored due to extensive existing research and potential performance drawbacks in DIII-D's specific operational regime.