Executive Summary: Thermalization in Conformal Field Theories

The summer workshop aimed to shed light on the intricate realms of thermal conformal field theories, bridging the gaps between recent advancements in theoretical physics. Distinguished physicists presented on a myriad of topics, integrating ideas from bootstrap techniques, Eigenstate Thermalization Hypothesis (ETH), AdS/CFT correspondence, black holes, and more.

Key Themes:

1. **Thermal CFT and Bootstrap Techniques:** The zero temperature bootstrap techniques' extension to finite temperature systems remains an unsolved quandary. Recent advancements have shown computation of thermal conformal blocks in both d=2 and d>2 dimensions.

2. **Eigenstate Thermalization Hypothesis (ETH):** A foundational ambition of theoretical physics, understanding thermalization from basic principles, has now been encapsulated in the concept of ETH. The hypothesis suggests the matrix elements of quasiprimary operators in finite energy eigenstates to be almost equivalent to thermal one-point functions. Recent research has explored this idea in d=2 conformal field theories (CFTs) and d>2 dimensions.

3. **Holography, Black Holes, and Thermal CFT Correlators:** Renewed attention to holographic thermal correlators seeks to unearth connections between black hole geometry and thermal CFT physics. Such explorations have yielded potential relationships between black hole properties and the boundary CFT.

4. **Deconstructing Finite Temperature Correlators:** With holography offering insights into finite temperature dynamics, it is of paramount importance to understand these phenomena from the CFT's perspective. Techniques like operator product expansions and conformal bootstrap are seen as the gateway to this realm.

5. **Thermal CFT Partition Functions:** A deep dive into the CFT thermal partition function reveals intriguing modular properties in d=2. Recent discussions have pivoted around the translation of these modular properties to thermal correlation functions, especially within superconformal CFTs.

Highlight Lectures:

- **Jorge Russo**: In his talk "Thermal correlators from geodesics", Russo demystified how OPE can be reconciled with the geodesic approach in computing holographic thermal correlators.

- **Alexander Zhiboedov**: During "Conformal collider physics and thermalisation", Zhiboedov highlighted fresh results within the realm of conformal collider physics.

- **Matthew Dodelson**: In "Zeroing in on thermal correlators", Dodelson elucidated a new formula for correlators based on quasinormal modes.

- **Luca Delacretaz**: His lecture "Bound on the thermalisation time of CFTs" revolved around the dynamics of hydrodynamics within CFTs.

- **Kostas Skenderis**: "The ambient space formalism: CFT at finite temperature" saw Skenderis illustrating efficient computation methodologies for finite temperature CFT correlators.

- **Pavel Kovtun**: With "Hydrodynamics and causality", Kovtun delivered an extensive review on the intertwining of hydrodynamics and causality.

The workshop, being a melting pot of ideas, witnessed the confluence of groundbreaking research, establishing a strong foundation for future explorations in the domain of thermal conformal field theories.