The ongoing exploration of quantum computers has ignited widespread curiosity regarding their practical applications beyond the realm of quantum speedup and supremacy. Delving deeper into the essential disparities between classical computing paradigms and quantum information networks unveils a plethora of innovative concepts and technologies poised to revolutionize various fields.

At the heart of quantum information lies the intricate web of quantum correlations which form the bedrock of quantum networks and underpin numerous quantum phenomena. Quantum Information Engineering harnesses these quantum correlations and quantum operations to design novel phenomena. Beyond merely unraveling the mysteries of physics, this approach promises to bestow mastery over chemical and biological processes, heralding a multitude of applications that transcend conventional scientific boundaries.

Drawing from my groundbreaking achievement in zero temperature quantum energy teleportation (QET) in 2023, leveraging IBM's quantum computers, I aim to embark on a comprehensive exploration of quantum information theory from a QET-centric perspective. Through this lens, I will delve into the potential applications spanning quantum statistical physics, quantum simulation, quantum cryptography, quantum biology, and quantum chemistry. In the realm of fundamental physics, elucidating the interplay between quantum correlations within many-body systems and the second law of thermodynamics will unravel insights akin to Maxwell's demon and feedback control. Meanwhile, in the realm of applied physics, tantalizing prospects emerge, including the conceptualization of quantum batteries and the elucidation of biological reactions at a quantum scale, facilitated by the nuances of feedback control mechanisms.

This colloquium endeavors to not only shed light on the transformative potential of quantum resources but also spark a discourse that transcends disciplinary boundaries, paving the way for a quantum-infused future ripe with possibilities.