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Overview of Low Emittance Transport and Beam Dynamics Studie of ILC Linacs

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The scientific mission of the International Linear Collider (ILC) relies on achieving high-energy high-luminosity beam collisions, which necessitate a low emittance beam transport section to ensure the maintenance of high-quality beam along the accelerator. Thus, the preservation of beam emittance during acceleration represents a fundamental design and operational objective of the ILC accelerator. This presentation aims to discuss crucial beam dynamics studies that review some of the critical sources of emittance dilution, including the dispersion arising from the Earth's curvature, misalignments of beamline elements, and coupler transverse kick. Additionally, we will address the implications of component failures at critical locations in the linac and resulting beam loss. The mitigation strategies developed in the context of the ILC linac are equally applicable and adaptable for newly proposed electron-positron colliders, such as the Cold Copper Collider (C3) and High Energy Lepton Collider (HELEN) collider.

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