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Input Optics for Gravitational Wave Detectors

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Gravitational wave detectors like Virgo and LIGO help us learn more about the universe. A key part of these detectors is the input optics system, which takes care of the optics downstream of the high power laser and delivers the beam into the interferometer. This presentation will explain how this system works and why it's important.

The input optics system does several important tasks: it makes sure the laser beam meets strict requirements, ensuring optimal spatial mode quality, and stabilizing both the frequency and power of the beam. Important parts of this system include modulators, mode-cleaning cavities, isolators, and optics that shape the beam. Each part is carefully designed to reduce noise and improve efficiency.

We will talk about recent improvements in the input optics for current detectors, especially during the Advanced Virgo and Advanced LIGO upgrades. These improvements have made the detectors more sensitive to low-frequency gravitational waves, allowing them to detect more cosmic events.

We will also discuss ongoing research and future developments to further improve the input optics system.

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