INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title	:	Coherent Control of Atomic Systems for various Applications: A Theoretical Exploration
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Coherent control is a promising technique for manipulating atomic and molecular systems. It has found numerous applications in a wide range of areas such as, ultra-cold physics, laser cooling, Bose-Einstein condensates, quantum information processing, attosecond physics and high precision spectroscopy. Coherent control of atomic and other quantum systems using laser pulses remains at the forefront of research in physics, chemistry and even in biological sciences. In this thesis, we use laser pulse induced coherent control methods for exploiting atomic systems for some interesting applications. We have proposed a scheme for effective control of optical multi-stability in a three-level V-type atomic system, which could find applications in optical switching. Also, we put forward a strategy to achieve slow and fast light in four-level ultra-cold atomic systems via coherent control. In the last part of the thesis, we propose a novel scheme to obtain effective focusing of a diverging atomic beam using femtosecond laser pulse. All the proposed schemes are analyzed with experimentally realistic parameters, making them to be realized within current state-of-the-art experimental setups.