



UNIVERSITY OF  
**WATERLOO**

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Nobel Laureate, Physics 2018

**Nobel Lecture (Public Lecture)**

**Title:** Generating High-Intensity, Ultrashort Optical Pulses

**Abstract:**

With the invention of lasers, the intensity of a light wave was increased by orders of magnitude over what had been achieved with a light bulb or sunlight. This much higher intensity led to new phenomena being observed, such as violet light coming out when red light went into the material. After Gérard Mourou and I developed chirped pulse amplification, also known as CPA, the intensity again increased by more than a factor of 1,000 and it once again made new types of interactions possible between light and matter. We developed a laser that could deliver short pulses of light that knocked the electrons off their atoms. This new understanding of laser-matter interactions, led to the development of new machining techniques that are used in laser eye surgery or micromachining of glass used in cell phones.