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Pushing the Limits of the Possible

An interview with **Andrea Damascelli**, Professor, UBC Physics and Astronomy
Scientific Director, Stewart Blusson Quantum Matter Institute

What has brought me to the physics I'm doing today had to do with very initial excitement about one idea, which was the interaction between light and matter. Of course, interaction between light and matter is all around us, but understanding that was the very beginning of quantum mechanics. And these days we can generate all kinds of form of light using accelerators. My group has developed a beamline which is called the Quantum Materials Spectroscopy Centre, all the way to lasers developed here at the Institute.

How does your research work?

These days we've gone into a kind of work where we use light, not only to probe the material but also to drive the material properties. We are used to looking at materials in terms of what kind of phase they display — water for instance can be a solid, it can be a liquid, it can be a gas. Often these phases are realized in a material by tweaking the chemical composition or solvent system.

These days we are coming in with an approach which is called the optical manipulation of quantum states. We use a laser source which generates extremely fast pulses, very short in time, to really drive the material with a very strong field to exhibit completely new properties, which may be very useful only for a very short amount of time. But perhaps that's all you need for that particular property.

My group these days is developing sources, developing beamlines, and studying new materials, engineering new materials that do not exist in nature, and probing them with this combination of optical tools where we photo-emit electrons and we drive their behaviour in completely novel ways.