RESEARCH2REALITY
Shining a light on research & innovation.

Powering the Next Phase of Life on Earth

An interview with researchers at the Matter Lab:
Alán Aspuru-Guzik, Quantum Mechanic
and **Govind Kumar**, Master's Student
University of Toronto

Alán Aspuru-Guzik

Humanity has not put a price on pollution at the level that we need to. The entire planet knows we need to have a clean energy transformation in the immediate time. That's just a fact. Consider the past century was a century of discovery without thinking about the bounds that we have. We were fishing and didn't realize that the fish were going to run out. We were polluting without thinking about how much plastic we were going to be dumping in the ocean. We were burning fossil fuels without feeling too much the impact. We chose a great investment. Of course now, humanity is at one of its greatest levels of wealth, but at the same time it's facing larger problems because of what we just built.

How does your research help these problems?

If there was political will, we do have enough technology to ride the storm of climate change. For example, in the field of solar, in the field of windmills, we're ready. We could have a transition really quickly. Having said that, there are still things, like the the ones I work on: for example, energy storage.

Govind Kumar

Most forms of renewable energy are intermittent sources of energy. Once the sun stops shining or the wind stops blowing, you stop making energy from solar or wind. If we are going to power society entirely on renewable energy, it's necessary to store that energy. Redox-flow batteries provide a very useful source of energy storage for large grid-scale applications, such as cities. We're talking about large tanks of liquid in which ions are dissolved, which when reduced and oxidized produce energy, and as such they're easily scalable.

The problem with redox-flow batteries in their current context is that metal ions, they use vanadium, and the cost of energy storage would be quite high. So what we aim to do in this group is to replace metal ions like vanadium with organic molecules. And so ideally we'll find a really good candidate which would then be able to power homes across the world.