Quantum information processing (QIP) is a far reaching goal of quantum technology. Whether QIP will ever be useful is yet unknown. It is also not clear what systems would eventually give rise to this technology. Would it be some room temperature spin system or superconducting solid state devices, or perhaps ions or photons would become the system of choice? Whatever the answer to both questions, the field of quantum computing has brought about an intense study of the foundations of quantum theory as well as a fascinating encounter between the fields of material science and quantum optics. Issues of isolation and control will eventually demand the highest available standards from material science.

In this brief presentation, I will give a very short introduction to QIP with neutral atoms and to the concept of the atom chip. I will then overview some of the methods used, as well as introduce some of the work which will be presented in the two QIP sessions which will follow.

I will end the talk with three examples from my own work, all concerning noise. The first concerns how noise couples to systems in which both internal and external degrees of freedom are at work in a coupled way. For example, in a typical 2-qubit gate the external potential is dependent on the internal (qubit) state. In the second example, I will describe how contaminating the metal of current carrying wires giving rise to magnetic traps, may reduce thermally induced noise. Finally, I will describe how utilizing electrically anisotropic materials may suppress decoherence and magnetic potential corrugations.