Laser Cooling

When the direction of laser beam is the same as atoms, the frequency that the atom feels will lower because of the doppler effect, so the force will small. As the same, when the direction is opposite, the frequency is higher and the force increases which can quickly slow the atoms down.

MOT

MOT means mangenetical optical trap. The MOT is made of 6 laser beams and 2 coils to create stable magnetical field. Due to the Zeeman effect, when encounter different polarization beams, the atom will go to the center where B=0, and that's how atoms are trapped.

In fiber cavity

MOT in fiber cavity is a little complex as the beam is small and the guide beam is applied to make the atoms to transport the atoms

Our light path

Divided into Repumping, Cooling, Mot and some double passing.

I design the ultra-stable vaccum cavity of our system in Solidworks

Building optical lattice

What is lattice? --> 2 waves create a valley which have the low and peak.
How moveable?-->move the PZT to shift the phase

1. Build the phase delay device on the left (green box): adjust the angle of the mirror with PZT so that the laser can return to the original path and re-couple into the optical fiber (observe the coupling degree as shown by the power meter PD1 in the picture)
2. Adjust the position of the red beam: Adjust the reflector above the green box so that the laser can pass through the center of the cavity membrane

3. Adjust the position of the blue beam: By adjusting its light collimator and the reflector above the yellow frame, the red light beam can be merged into the light collimator in the lower right corner. After adjusting the light collimator, insert the optical fiber of the blue beam, and fine-tune it according to PD1.
4. Build a phase-locked interferometer: See the yellow box, first adjust the coupling of the blue beam with the PZT reflector and the coupling head of PD2, and then adjust the coupling of the red beam with the angle of the lower left reflector and BS.
   Finally, they adjust each other to achieve the best interference effect.

Cavity cooling/Feedback cooling, enough

2D materials

What we focused on is the high quality single photon emissions.
There are some ... such as... and the ... we use to track the properties are...

Mechaism of SPE in 2D material

In our materials, we use nanopillars to change the bandgap of materials and the defect may change its energy too. The excitation may help the bright band to emit SPE and there are still other defect levels which will low the Purity of SPEs.