

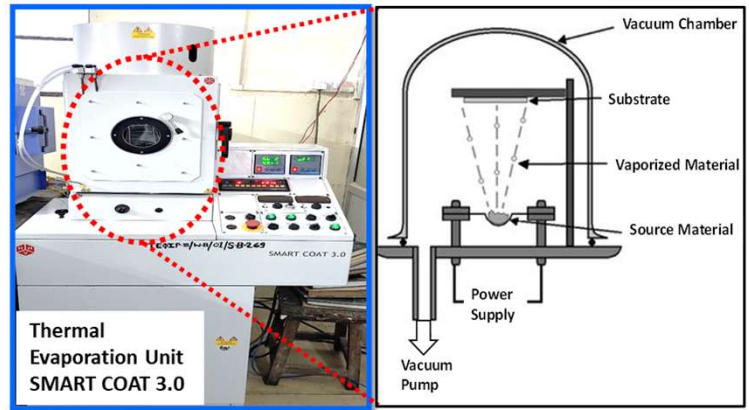
# RESEARCH LABORATORY EQUIPMENT

## Department of Physics

### Harcourt Butler Technical University (HBTU), Kanpur

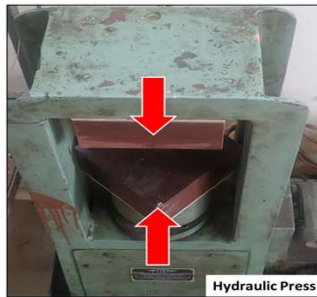
#### Thin Film Deposition System

- ✓ Thin films are layers of materials that are fabricated using atom-by-atom fabrication.
- ✓ Thermal evaporation is one of the highly used thin film deposition techniques, where the material is thermally heated in a vacuum environment.
- ✓ Various materials such as Au, Ag, In, Ga, Al, Bi, Se, NiO, MoS<sub>2</sub> (2D material), Bi<sub>2</sub>Se<sub>3</sub> (**Quantum Material**), etc. are being deposited with a thickness of 1 -500 nm.
- ✓ Thin Films are being investigated for quantum and magnetic properties for spintronics applications.



#### Hydraulic Press

- ✓ To synthesize materials of alloys and compounds in the form of pellets
- ✓ High Pressure helps to make bulk samples such as thermoelectric materials such as Bi<sub>2</sub>Te<sub>3</sub>, SnSe, PbTe, etc.



#### Muffle Furnace

- ✓ Used for heat treatments of the materials at High Temperatures (1000 °C)
- ✓ High temperature helps to synthesize crystals from the powder phase
- ✓ It is used to fuse glasses, ceramic heat treatments, and brazing.



#### LCR Meter

- ✓ Used to measure Resistance (R), Capacitance (C), and Inductance (L) of electronic circuits.
- ✓ Useful for ceramic materials
- ✓ Measuring Frequency Range: 20 Hz to 500 kHz.



#### Weighing Machine

- ✓ Weighing Machine to measure the weight of samples
- ✓ Maximum measure weight: 120 gm
- ✓ Accuracy: 0.01 mg.



#### Magneto Resistance Setup

- ✓ Used to measure the magnetoresistance of magnetic samples
- ✓ Used to measure the Hall effects such as anomalous Hall effect in semiconductors and metallic systems
- ✓ Maximum magnetic Field: 0.5 Tesla

