CCC #1

Charlie Coleman

Potential SC Materials

- Carbon Nanotubes (src)
- Black phosphorus (src)
- Gallium Nitride (src)
- Germanium (src)

Carbon Nanotubes

- Characteristics:
  - Carry ~2x more current
  - Faster and more efficient than Si
- Cost: $2/g, 4x more expensive than Si
- CNT transistors will outperform Si at the same scale

Black Phosphorus

- Characteristics
  - High carrier mobility (operates at low voltage)
  - BP allows for smaller transistors
- Cost: Unknown, not sold commercially
- n- and p- type can be placed on one chip by varying thickness + contact metal

Gallium Nitride

- Characteristics
  - Lower power consumption
  - Smaller transistor size
  - High power density
- Cost: $17/gram (34x more than Si)
- New technology, expensive but promising
- Used in LEDs currently

Germanium

- Characteristics
  - Higher mobility
  - Smaller bandgap (0.66eV vs. 1.12eV)
- Cost: $1/g (2x more than Si)
- Has a native oxide, but difficult to grow less than 20nm in thickness