



U.S. MAGNET  
DEVELOPMENT  
PROGRAM

# Current status of high- $C_p$ Nb<sub>3</sub>Sn conductor development

Xingchen Xu

Fermi National Accelerator Laboratory

Xuan Peng (Hyper Tech Research Inc), Fang Wan (Fermilab), Jacob Rochester & Mike Sumption (OSU)



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Science

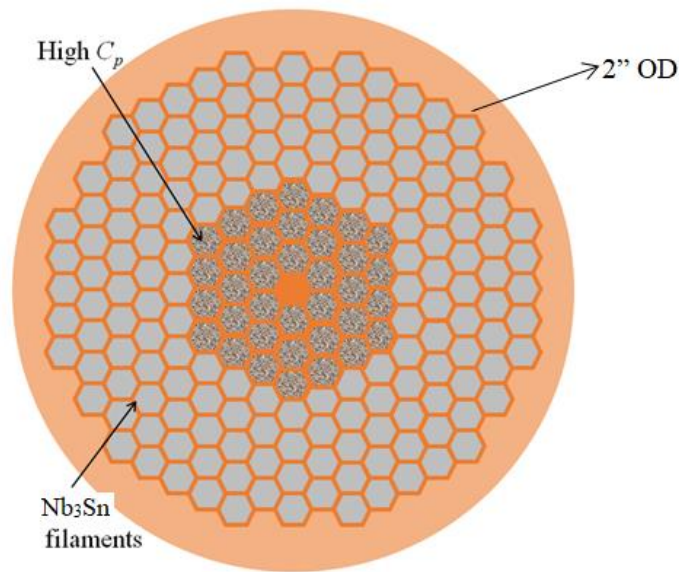
# Current status of high- $C_p$ strand development

The wire development work (e.g., optimizing wire design, recipe, etc.) is more or less finished.

Ongoing work for high- $C_p$   $\text{Nb}_3\text{Sn}$  wire:

- I. Draw a big billet down to make some long-length wires (Hyper Tech)
- II. Use the short wires we have now to fabricate a small coil to test training performance (Allen Rusy)

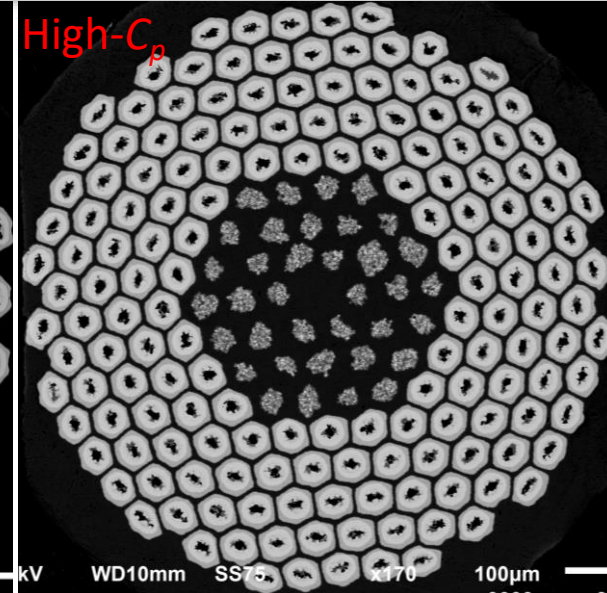
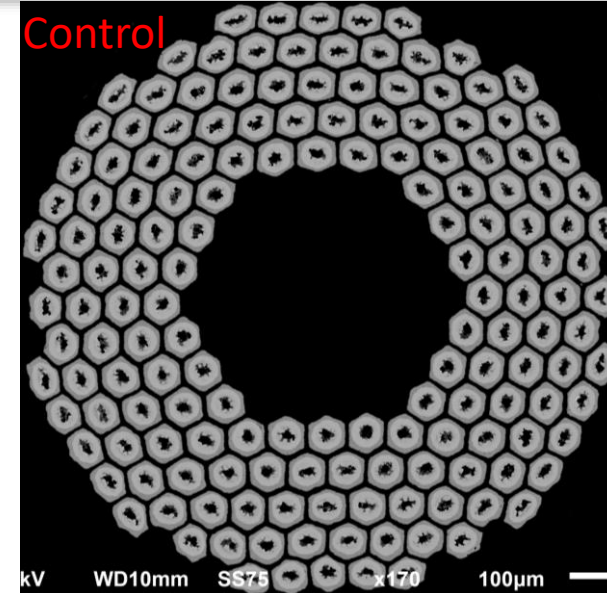
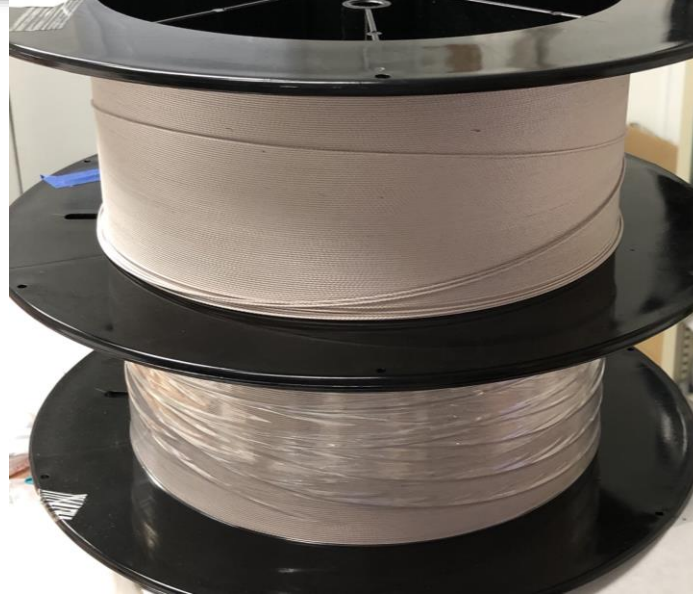
Current status of the big billet:



- All the filaments were made by Feb 2023. The billet has been ready to draw.
- But has been stuck at the stage of drawing the billet from  $\Phi 2''$  to  $\Phi 3/4''$ .
- Hyper Tech can draw billets as large as  $3/4''$ . Need an outside vendor for  $2''$ .
  - Made agreement with Luvata in 2022. But it did not work out.
  - Now making agreement with ATI.
- After the billet is drawn to  $\Phi 3/4''$ , the rest should be quick.

3' long x  $\Phi 2''$  billet (14 kg) → 2-5 km long wires.

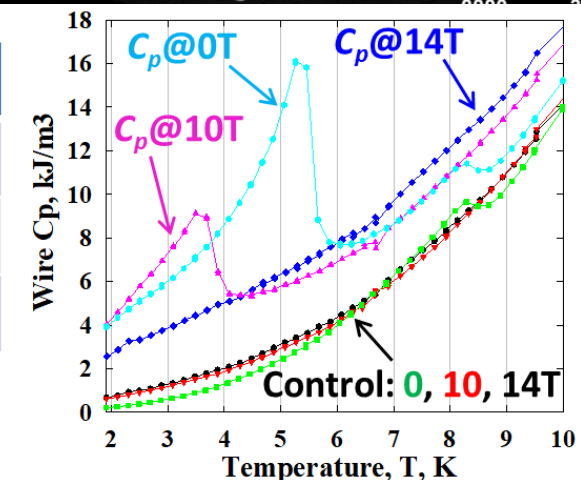
# Use short wires to test training performance



## Wires:

- Both: 0.6mm diameter,  $d_{fila} \sim 30 \mu\text{m}$ , 15mm twist pitch.
- Insulation: S2 glass, 0.065mm thick.
- Wire length we have now: 60 m control, 90 m high- $C_p$ .

Component vol%	Control	High- $C_p$
Nb <sub>3</sub> Sn filaments	46%	46%
High- $C_p$ filaments	-	4.5%
Cu matrix	54%	50%



Current status: Allen Rusy is waiting for the winding machine.