ELECTROMECHANICAL BEHAVIOUR OF PIT Nb_3Sn CONDUCTORS FOR NED

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OUTLINE

- Characteristics of studied PIT conductors

- Distribution of the critical temperature T_c

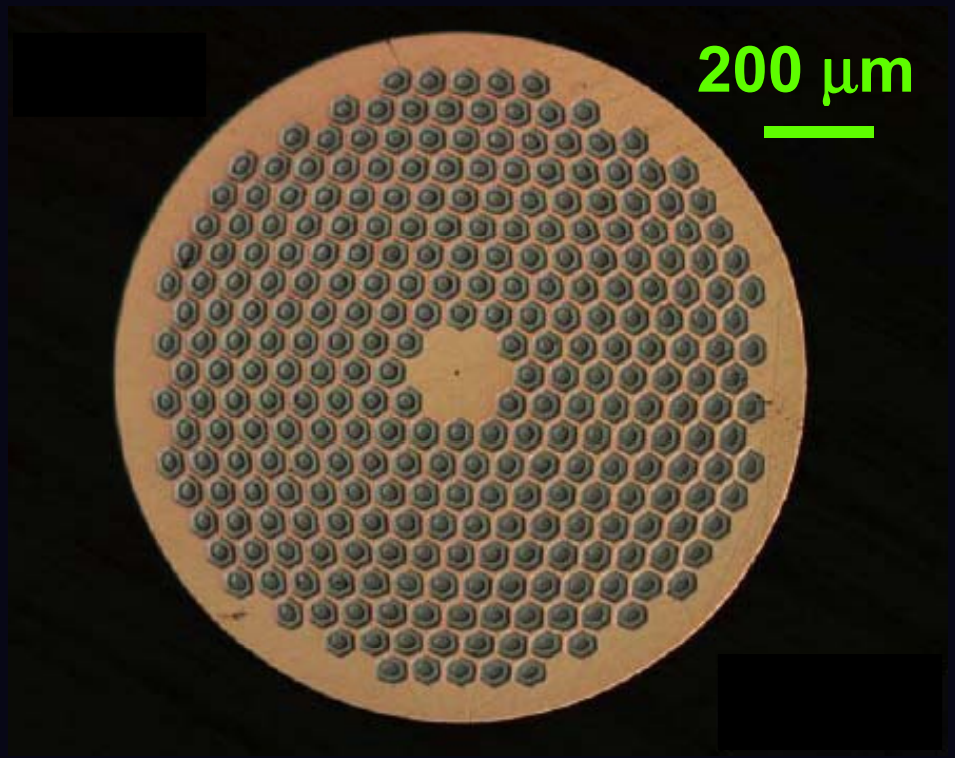
- Critical current vs. axial tensile strain, B

- Critical current vs. transverse compressive loads, B

- Projected area vs. real area

- Conclusions

Nb_3Sn PIT WIRE (SMI-EAS)



#207 and #215

Ø 1.25 mm

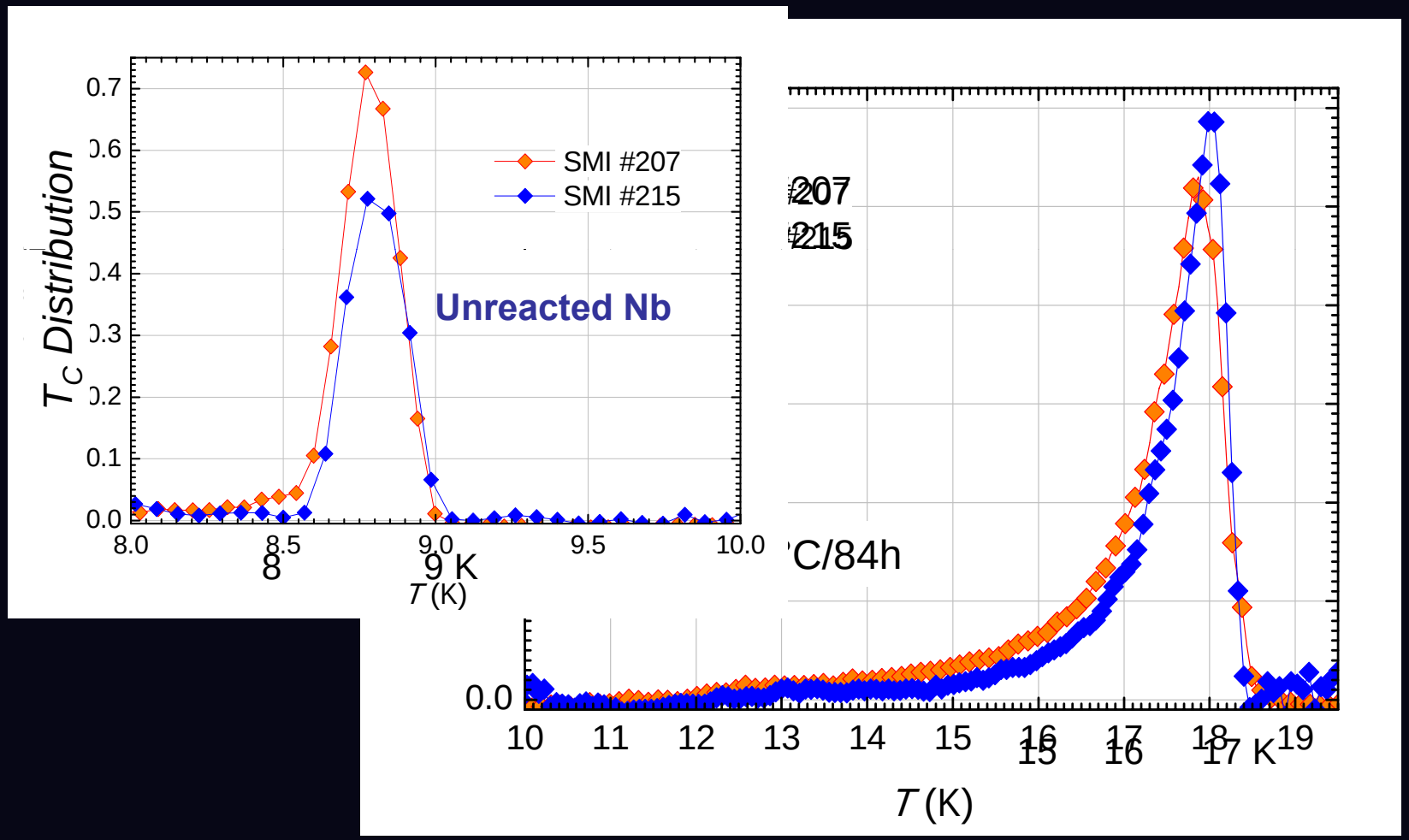
Filament Ø ~ 50 μm

Filaments = 288

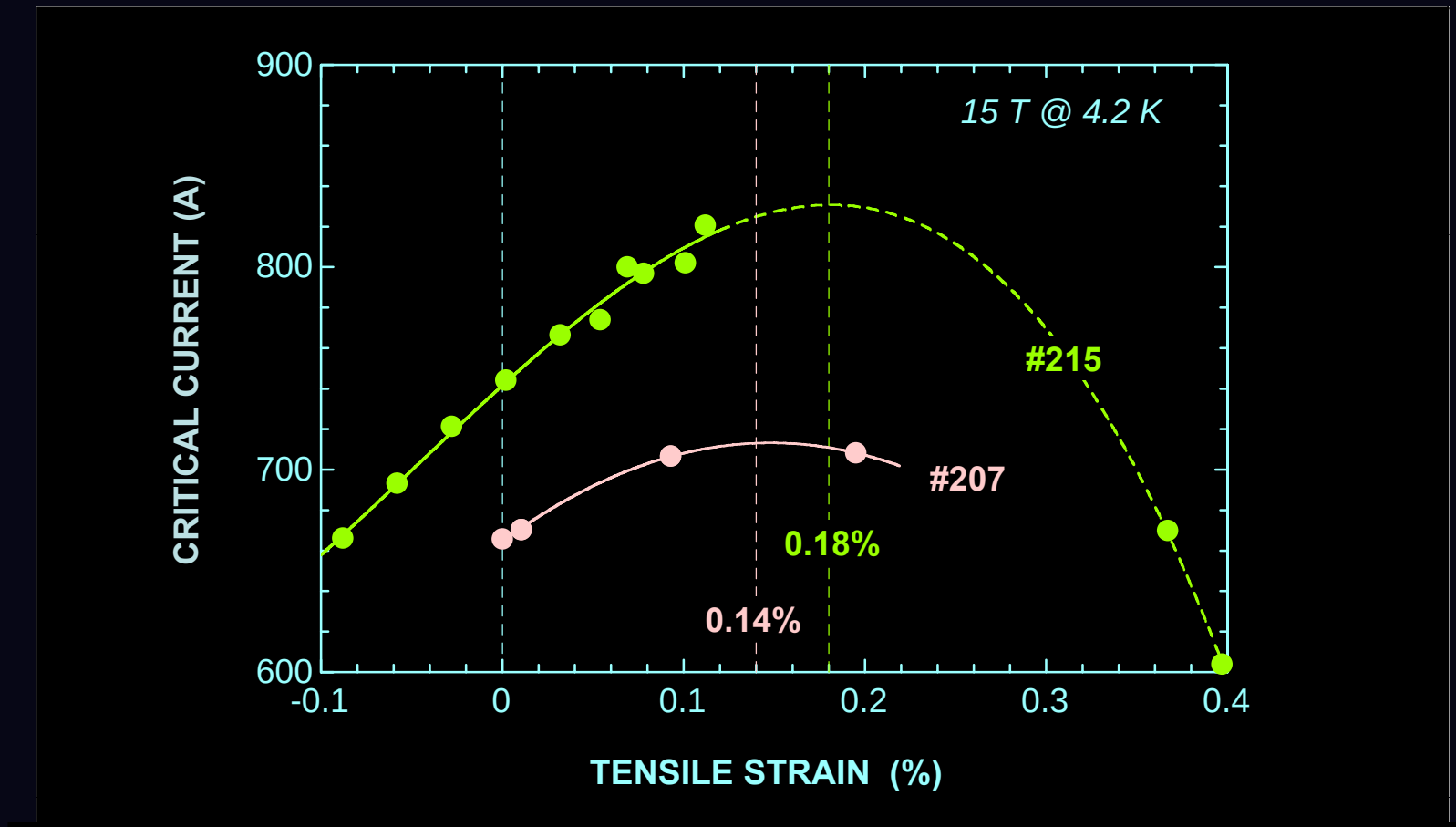
Twist pitch = 20 mm

Cu/non-Cu ~ 1.22

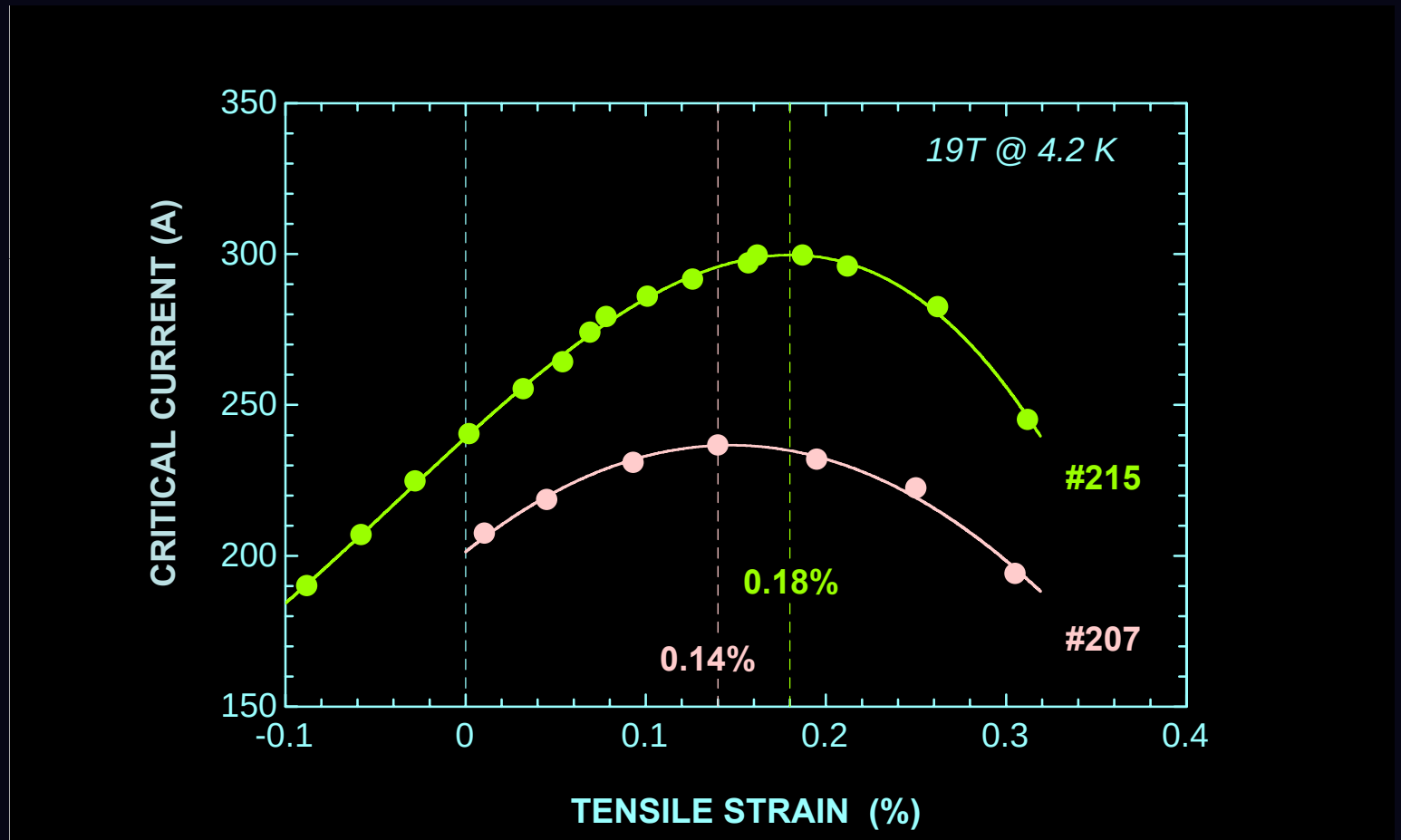
T_c DISTRIBUTION (Courtesy of C. Senatore)



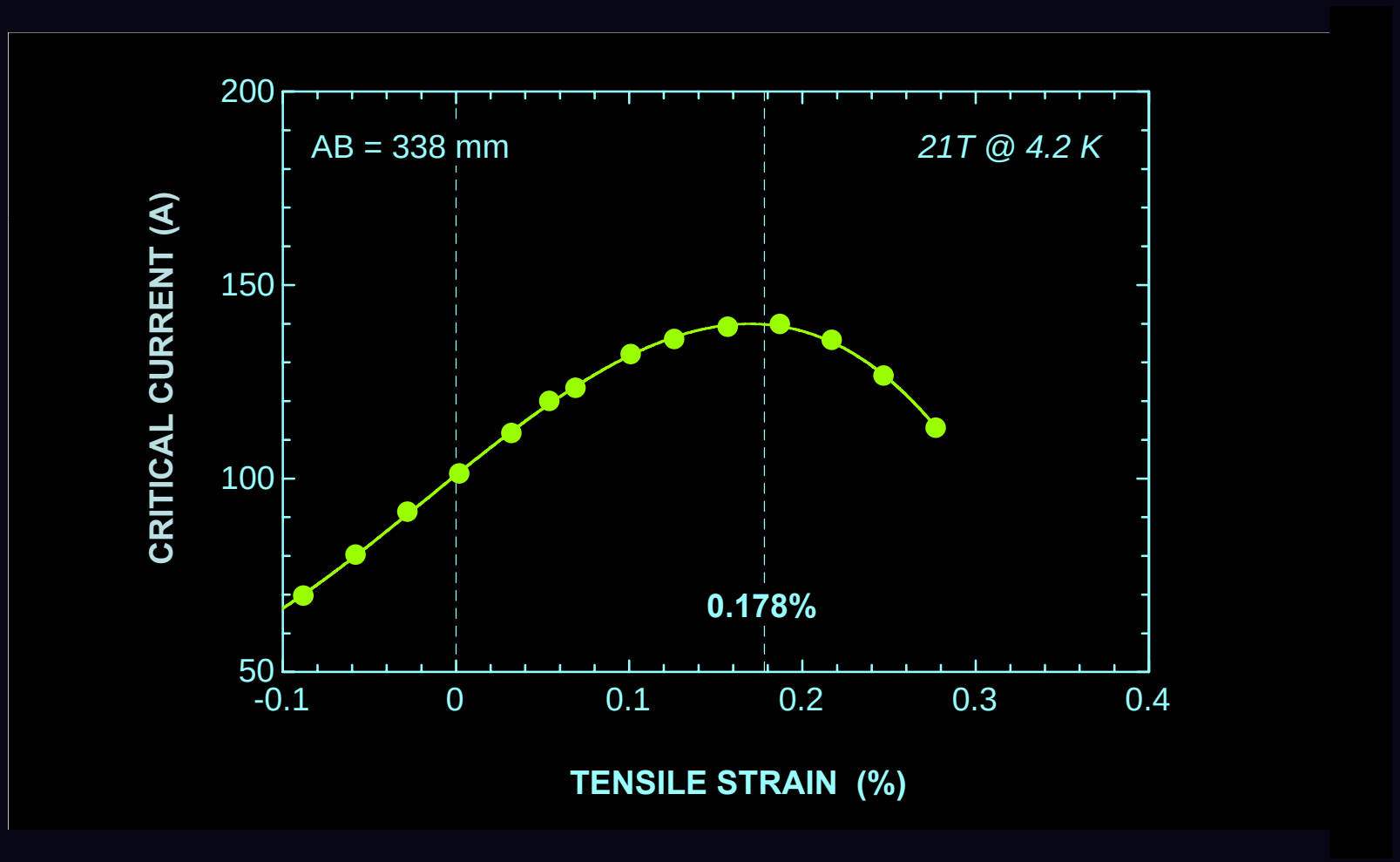
I_c vs. axial tensile strain, B



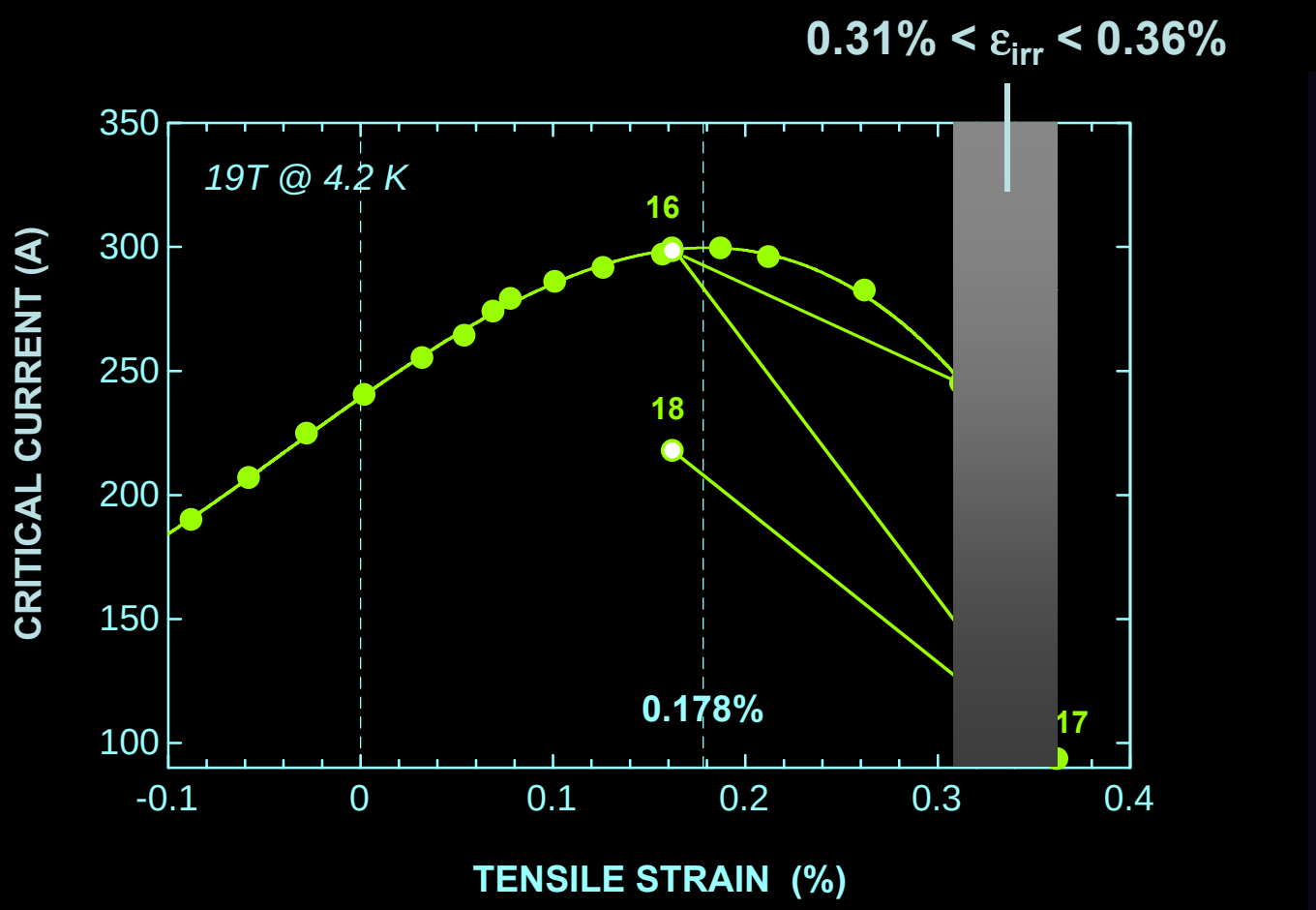
I_c vs. axial tensile strain, B



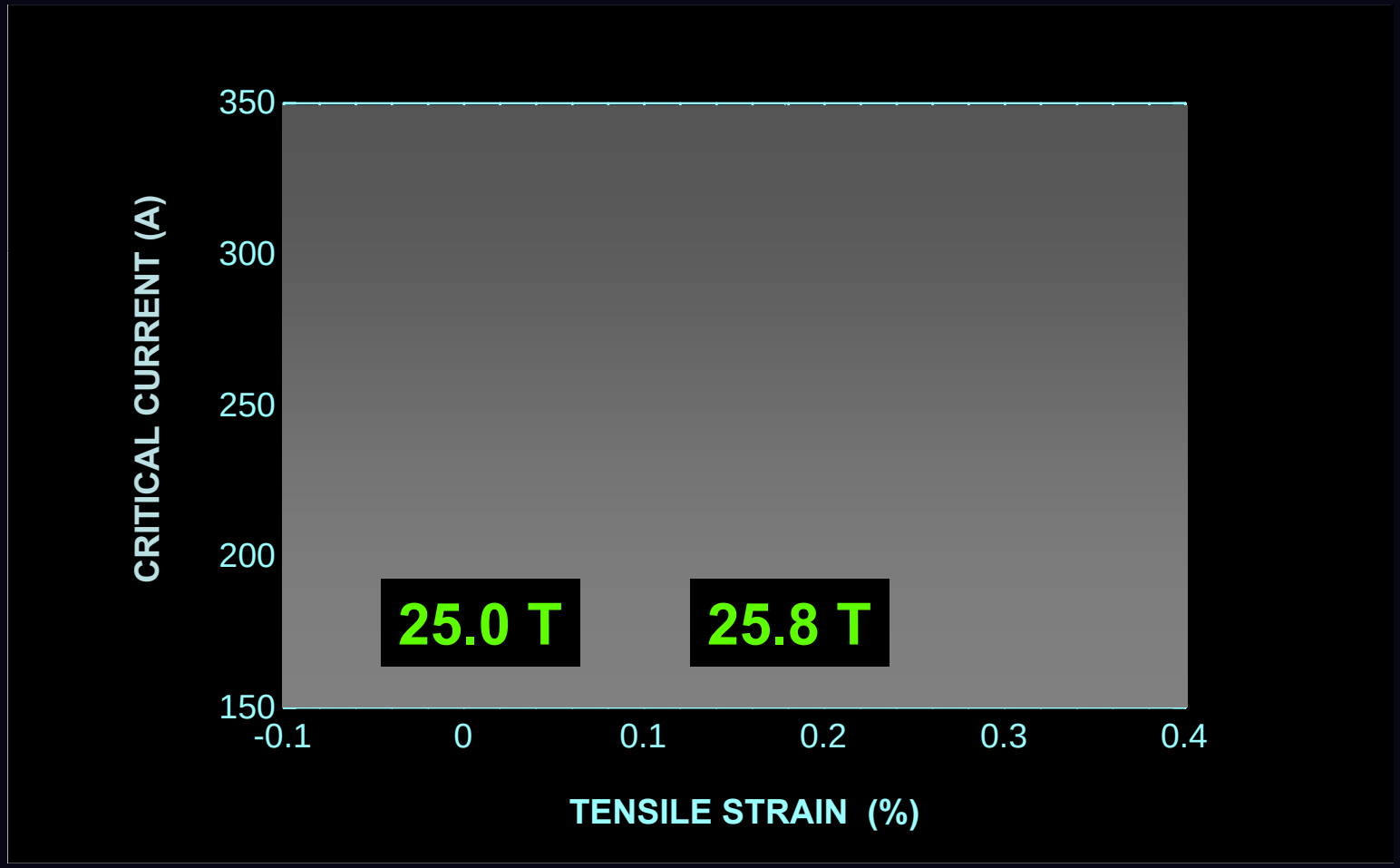
#215 - I_c vs. axial tensile strain, B



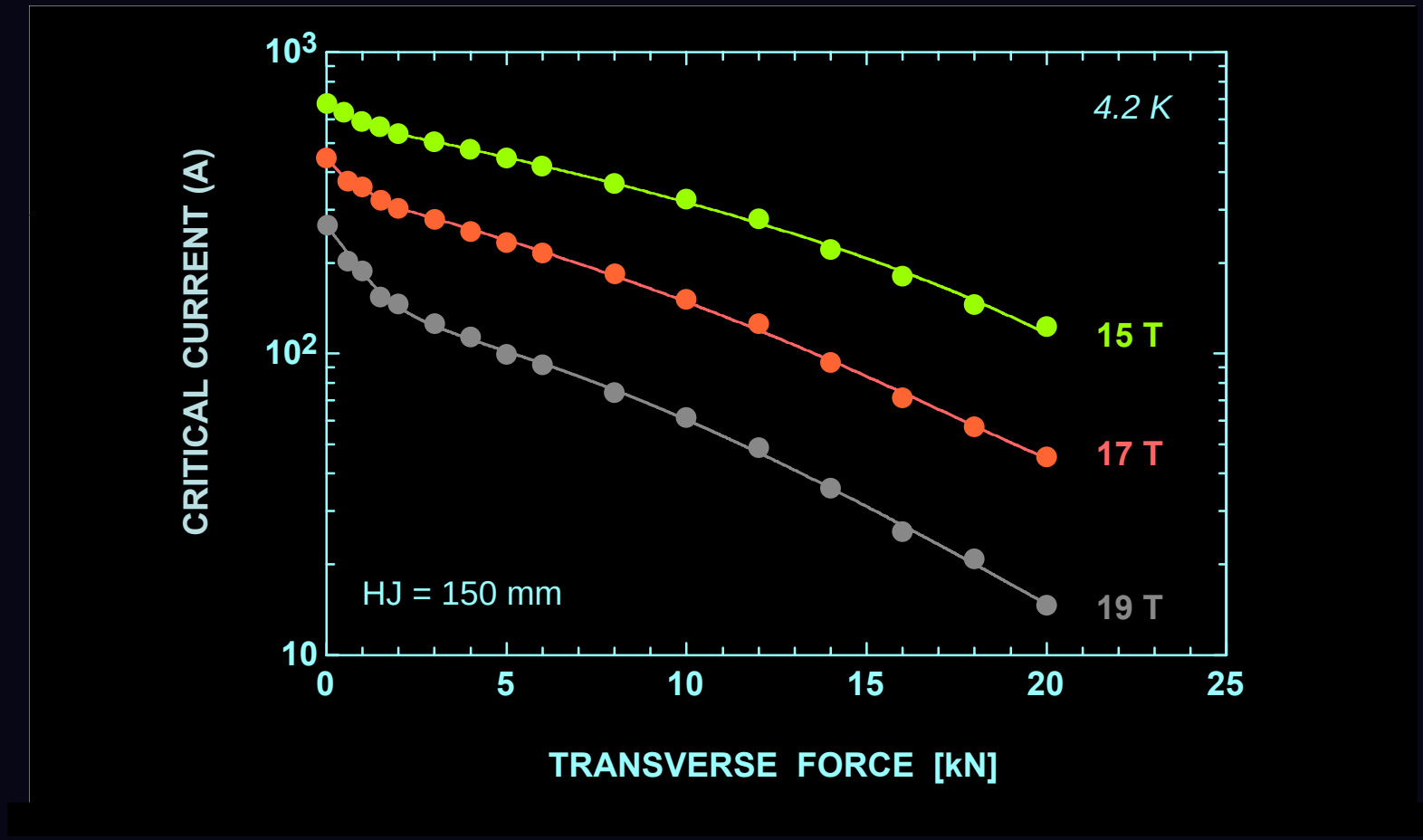
#215 - Irreversibility limit ε_{irr}



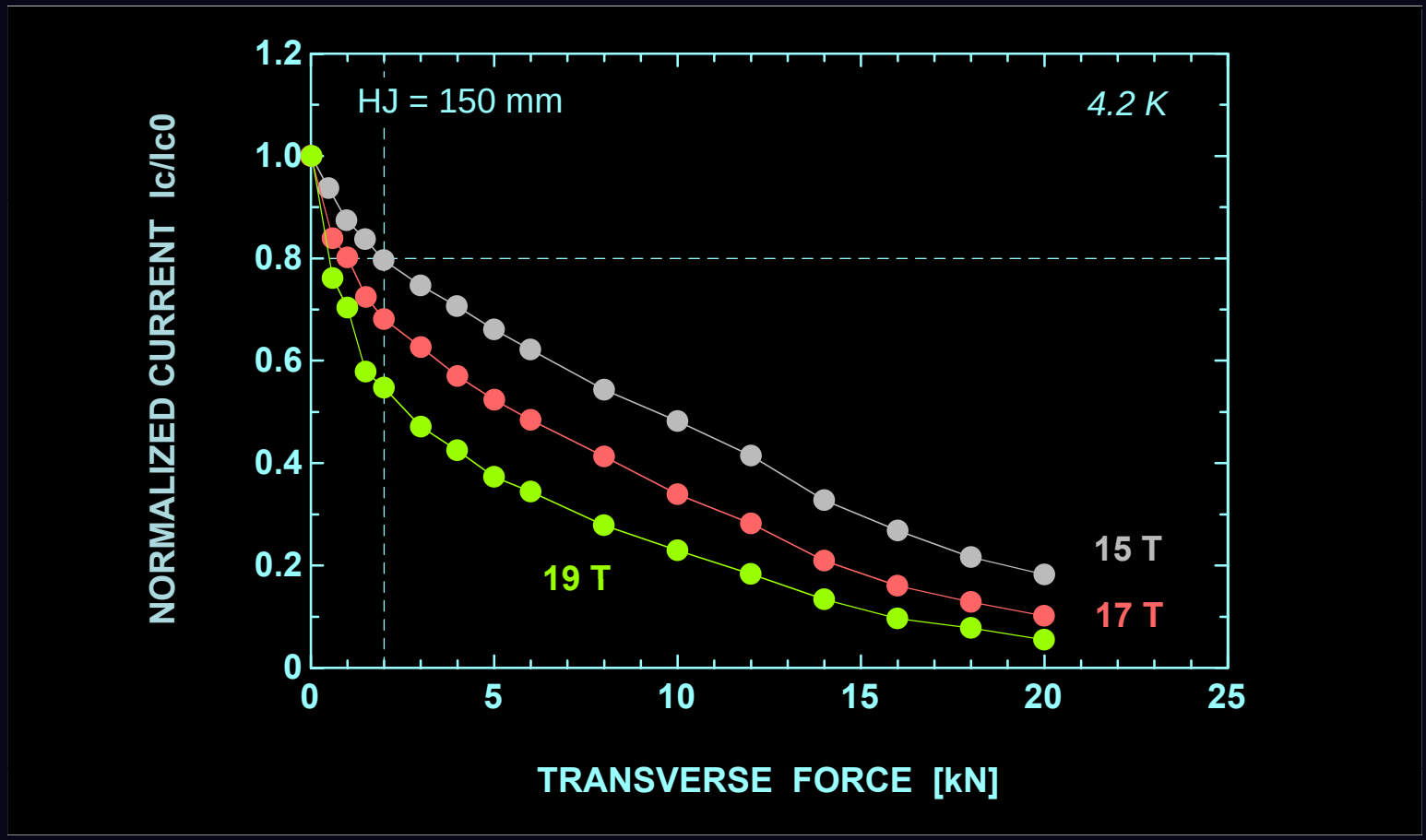
#215 - Kramer upper critical field B_{c2}(4.2K)



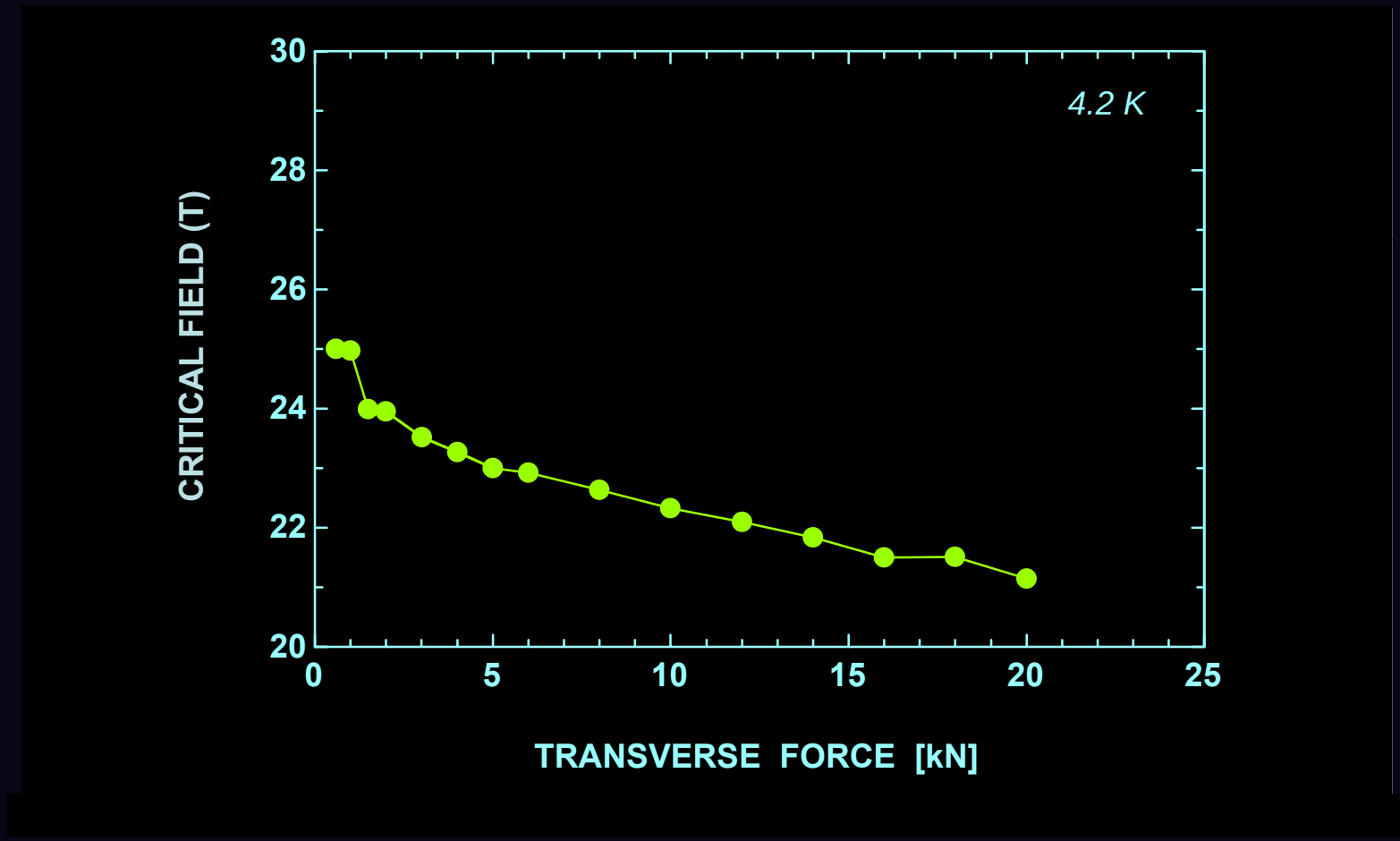
#215 - I_c vs. transverse compressive loads



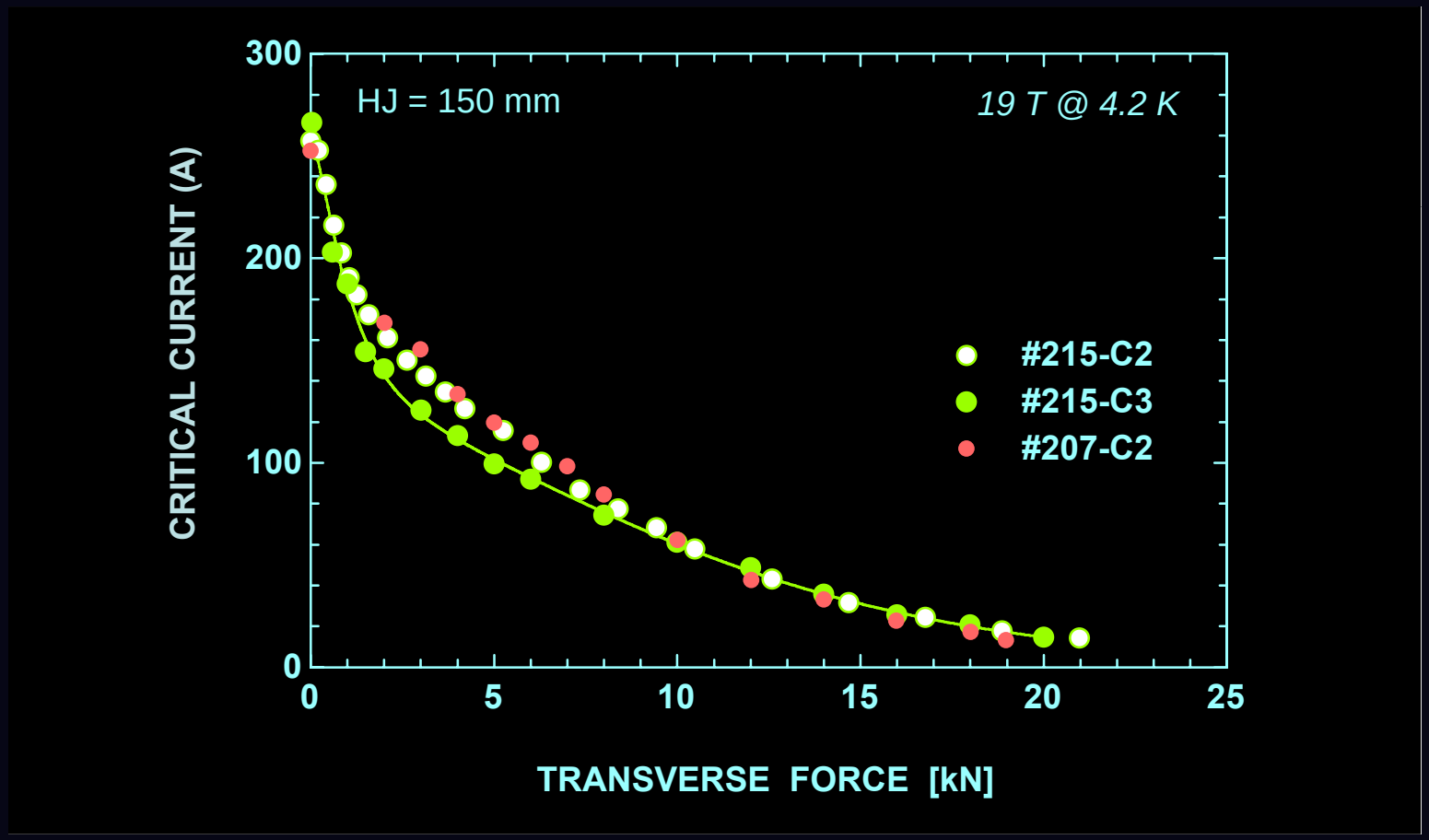
#215 - I_c vs. transverse compressive loads



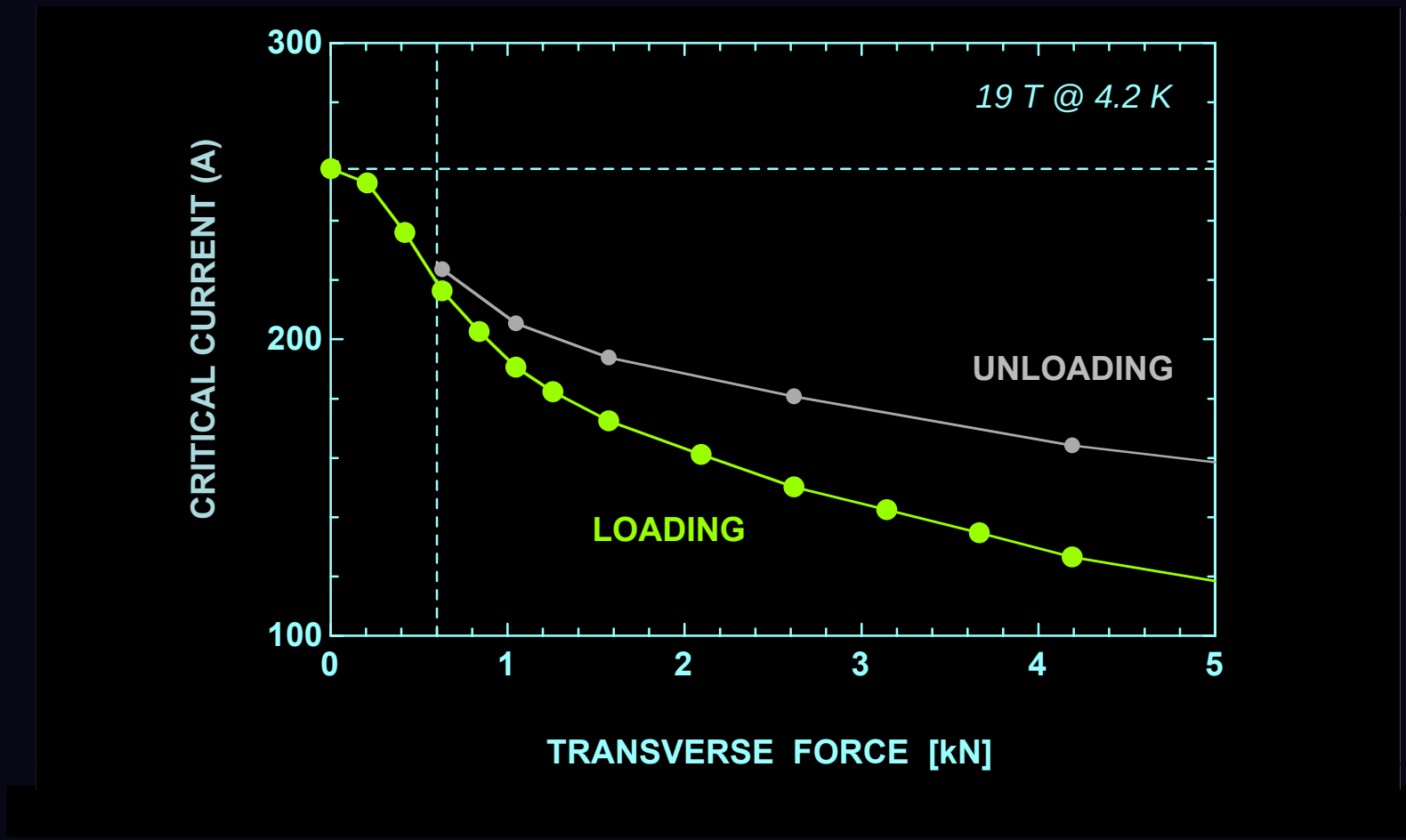
#215 - Kramer B_{c2}



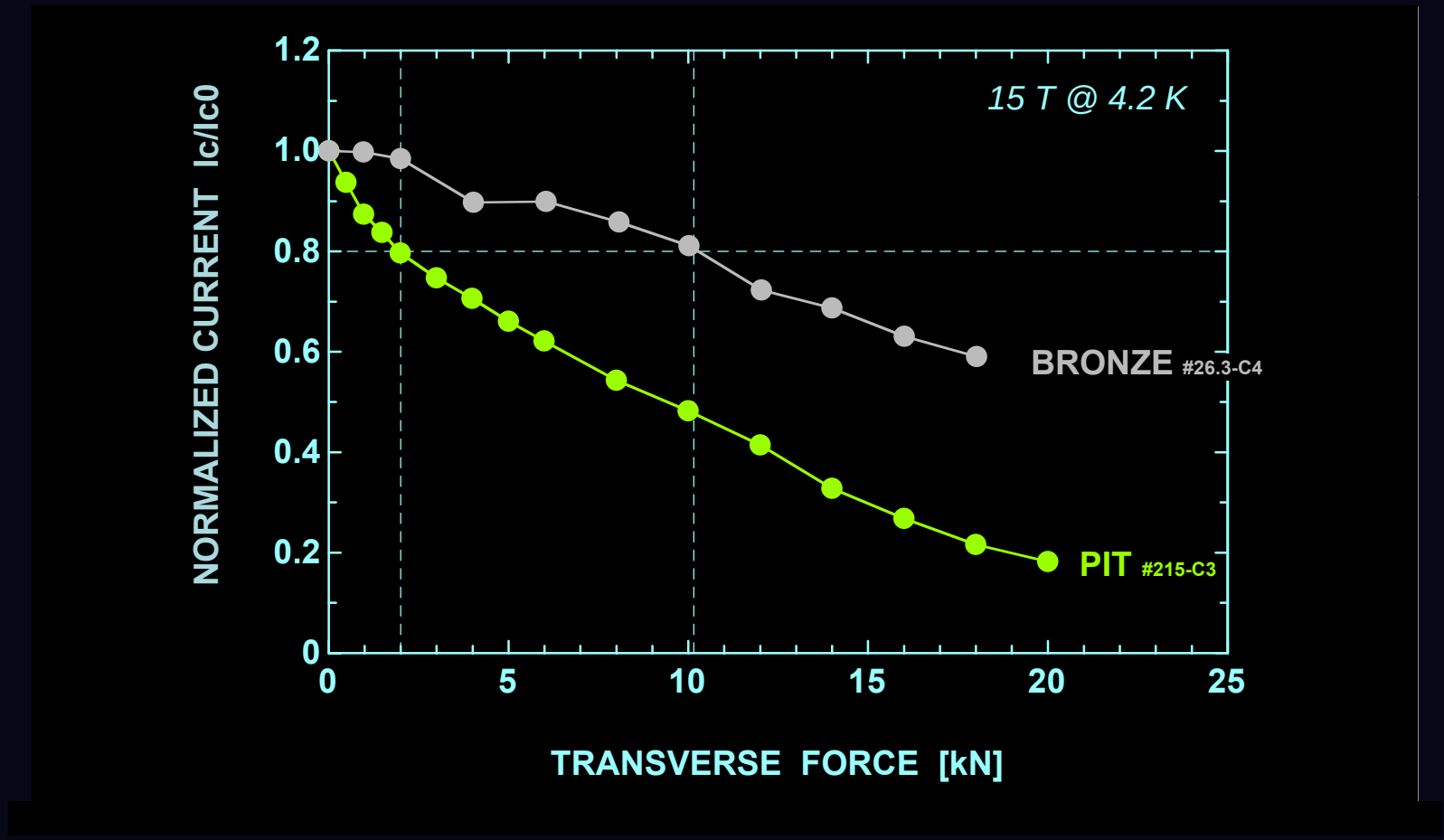
Reproducibility of I_c



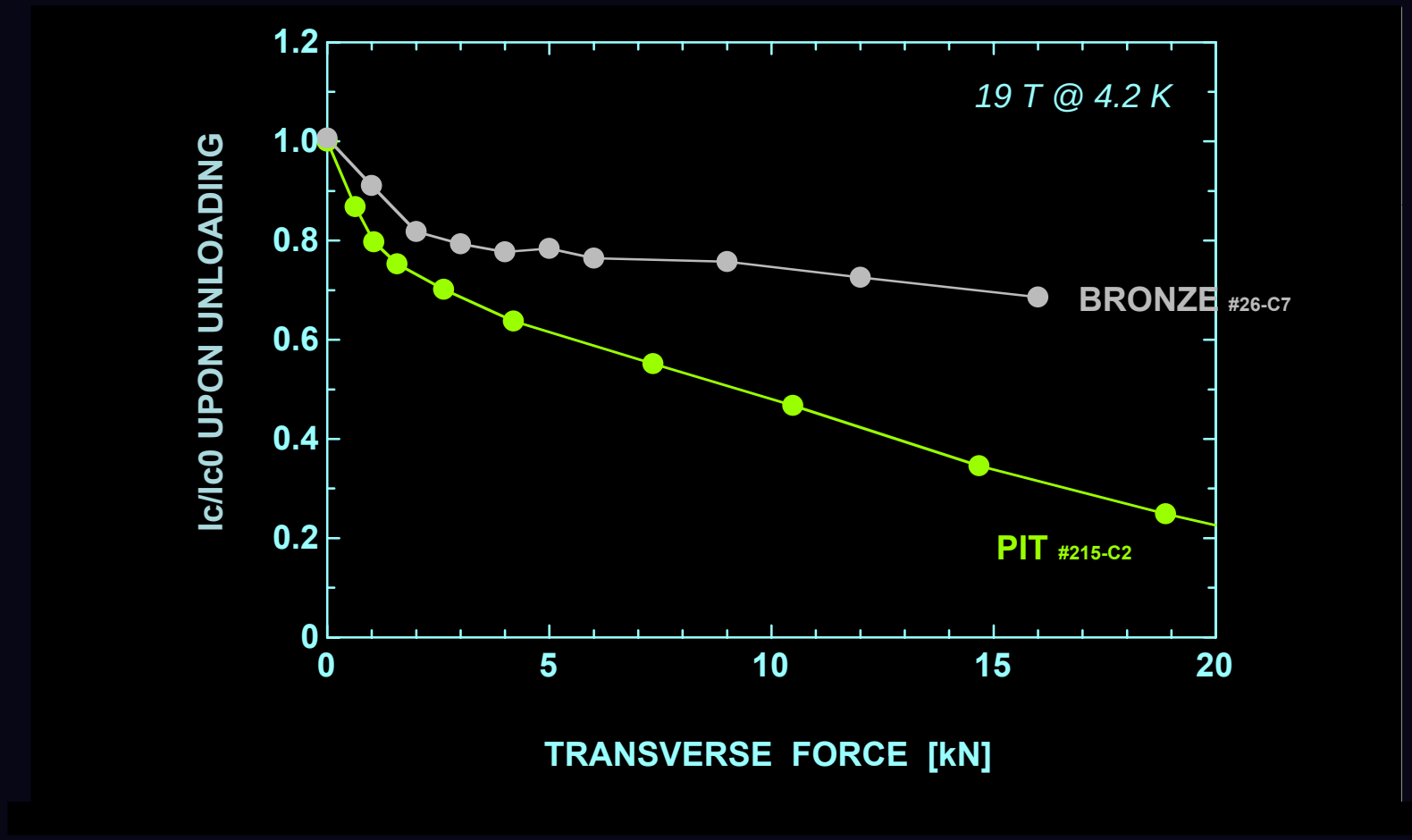
#215 - Irreversibility of I_c



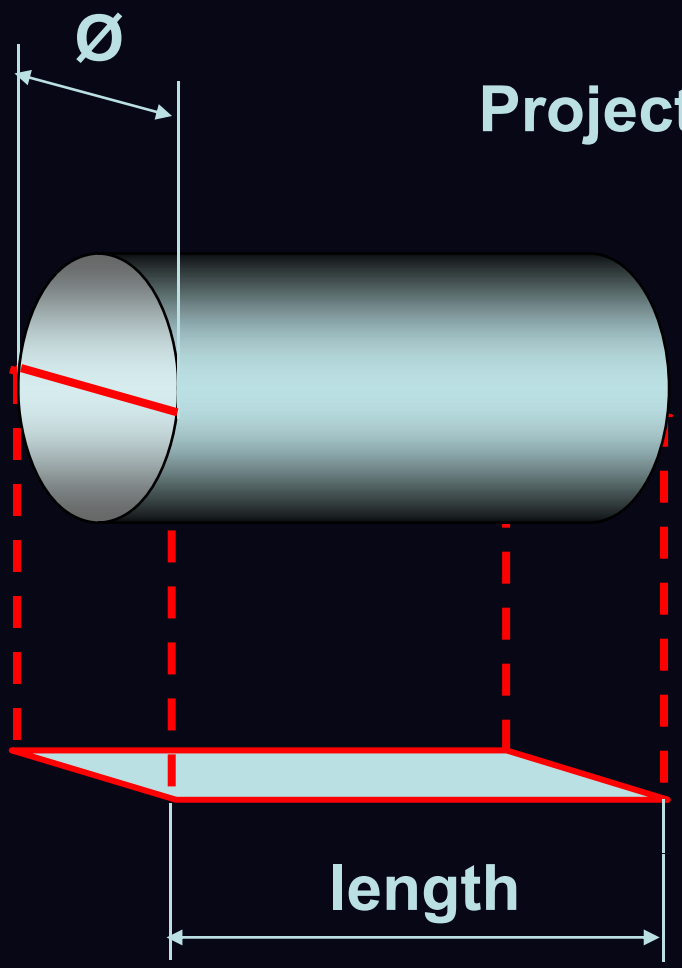
PIT vs. Bronze route Nb_3Sn



PIT vs. Bronze route Nb_3Sn



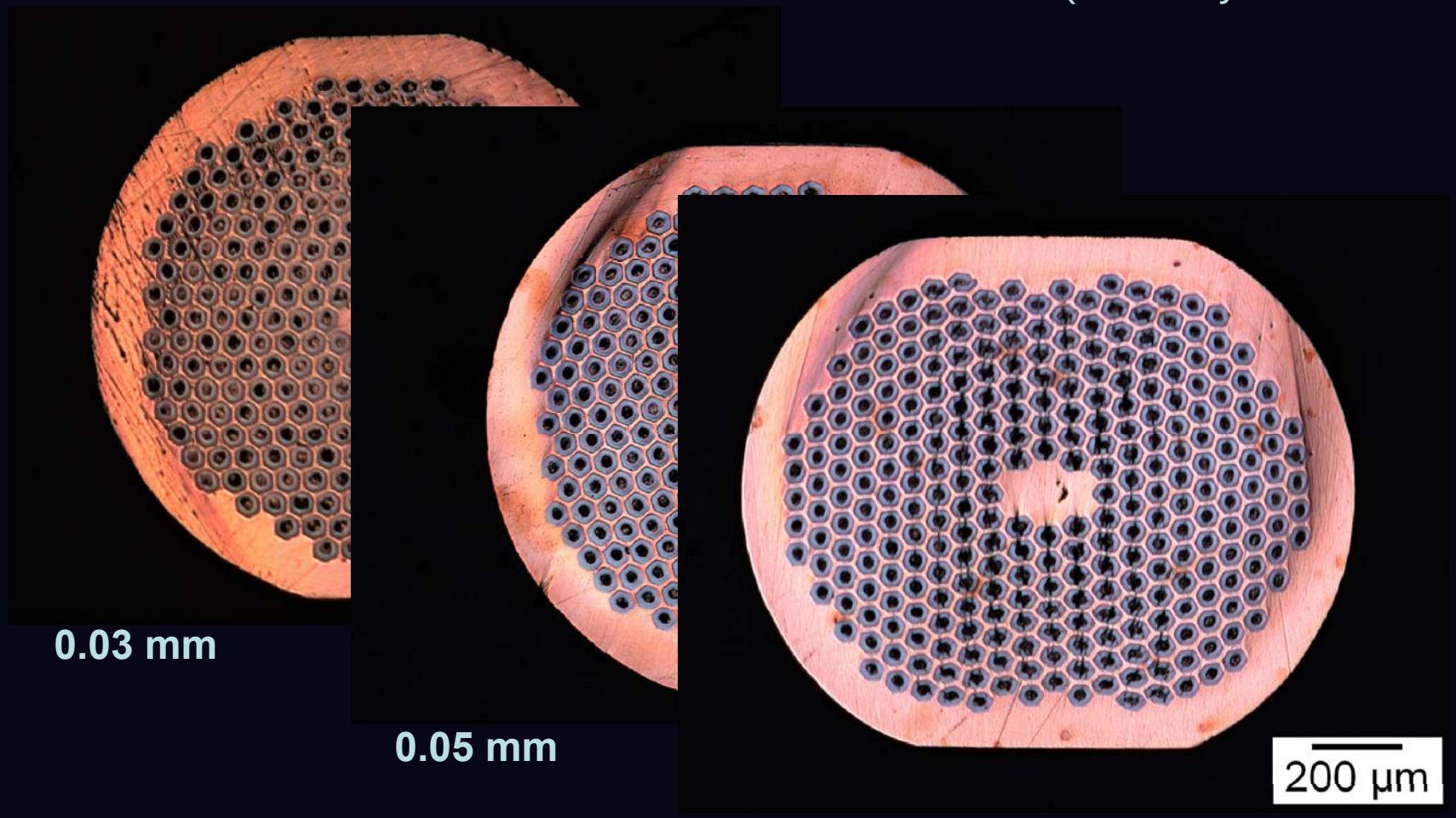
PROJECTED AREA



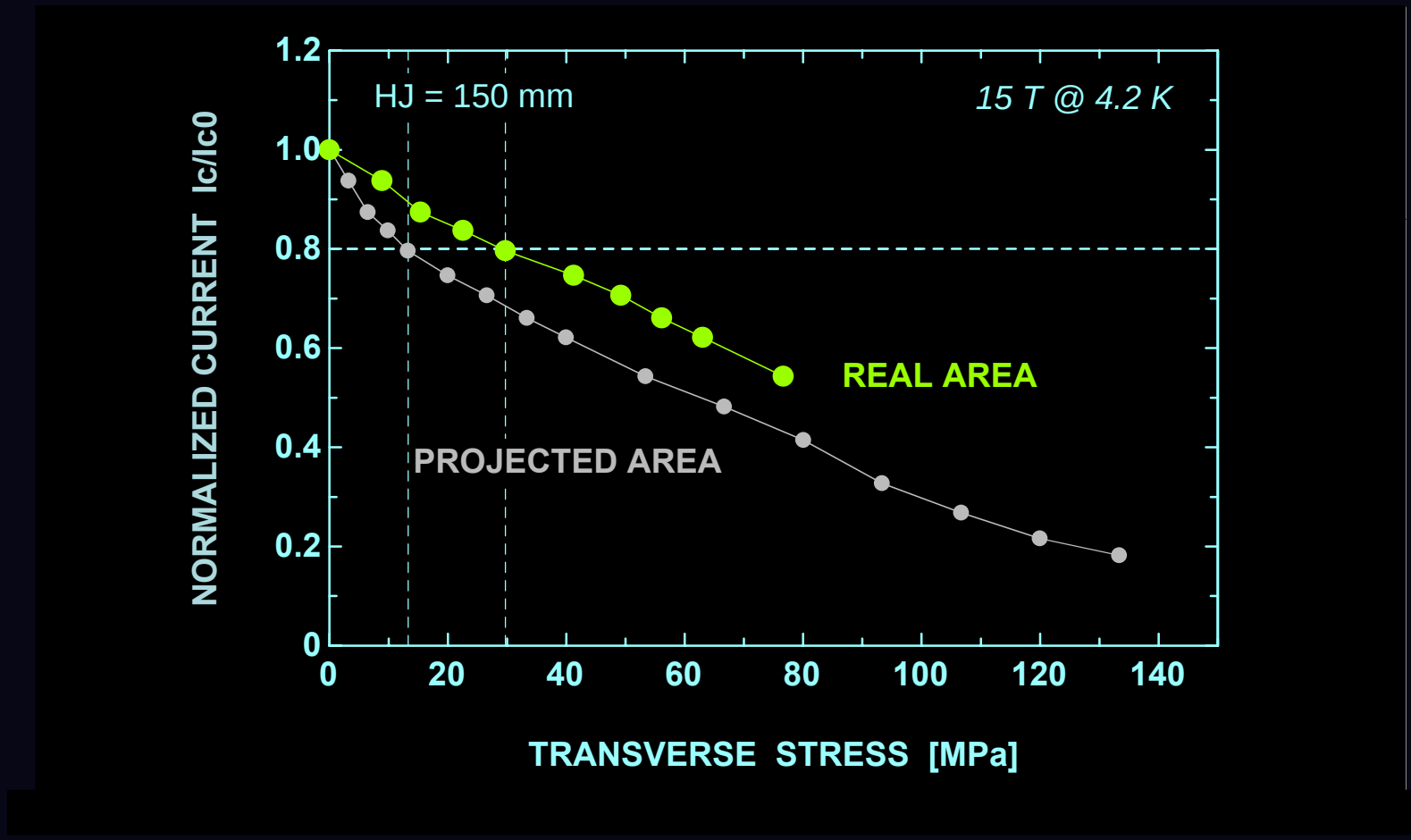
Projected area = diameter x length

#215 - Deformation after heat treatment at RT

(Courtesy of T. Boutboul)



#215 - I_c vs. transverse compressive stress



CONCLUSIONS

PIT under tensile strain:

- similar to bronze route
- however smaller ε_m and ε_{irr}

PIT under transverse compressive load:

- I_c degradation vs. field similar to bronze route
- I_c decreases faster with applied force
- I_c irrreversibility is higher

Projected area underestimate stress