

# CORC® like cable production and its use in the coil winding

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**Cable machine designed and constructed:** main parts - belt cable pulling device and two carousels, each carousel contains four coils as sc. tape containers

**Produced superconducting cable:** eight SuperPower SCS4050-AP tapes of length 50m,  $I_c$  from 146 to 169 A ( $\Sigma$  1240 A), sc. layer oriented inward, 40 m long cable in one run, speed 6 m/hour, cable consists of two layers wound in the same direction, cable core - Cu tube, outer diameter 6.35 mm

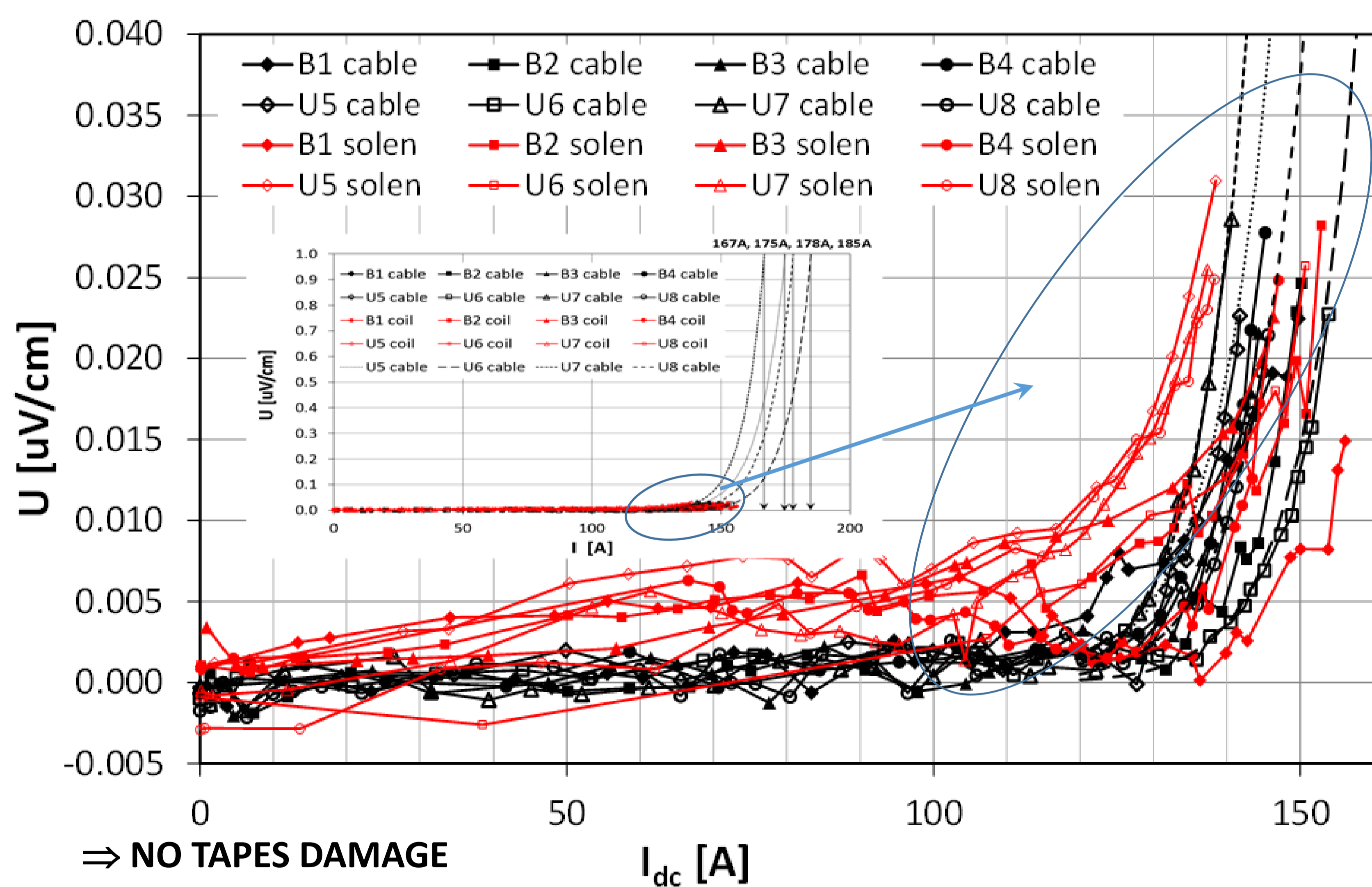
Cabling machine and detail showing the tape depositing on cable core

Cable rewound on fiberglass tube of  $\phi$  20 cm forming one layer coil suitable for its dc characterization

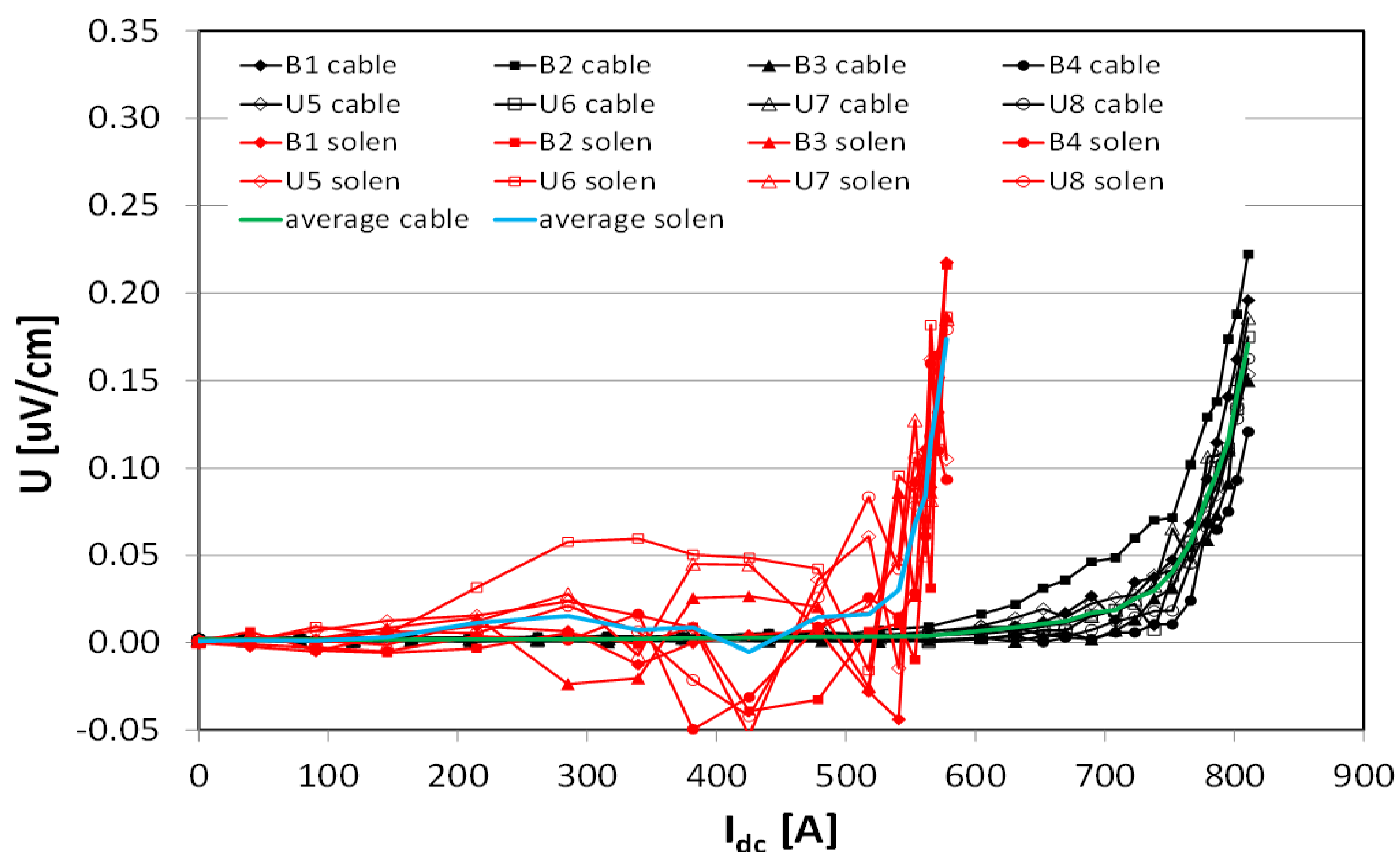
Solenoid having four layers every containing 20 turns, outer  $\phi$  18 cm, inner  $\phi$  12 cm and height 15 cm



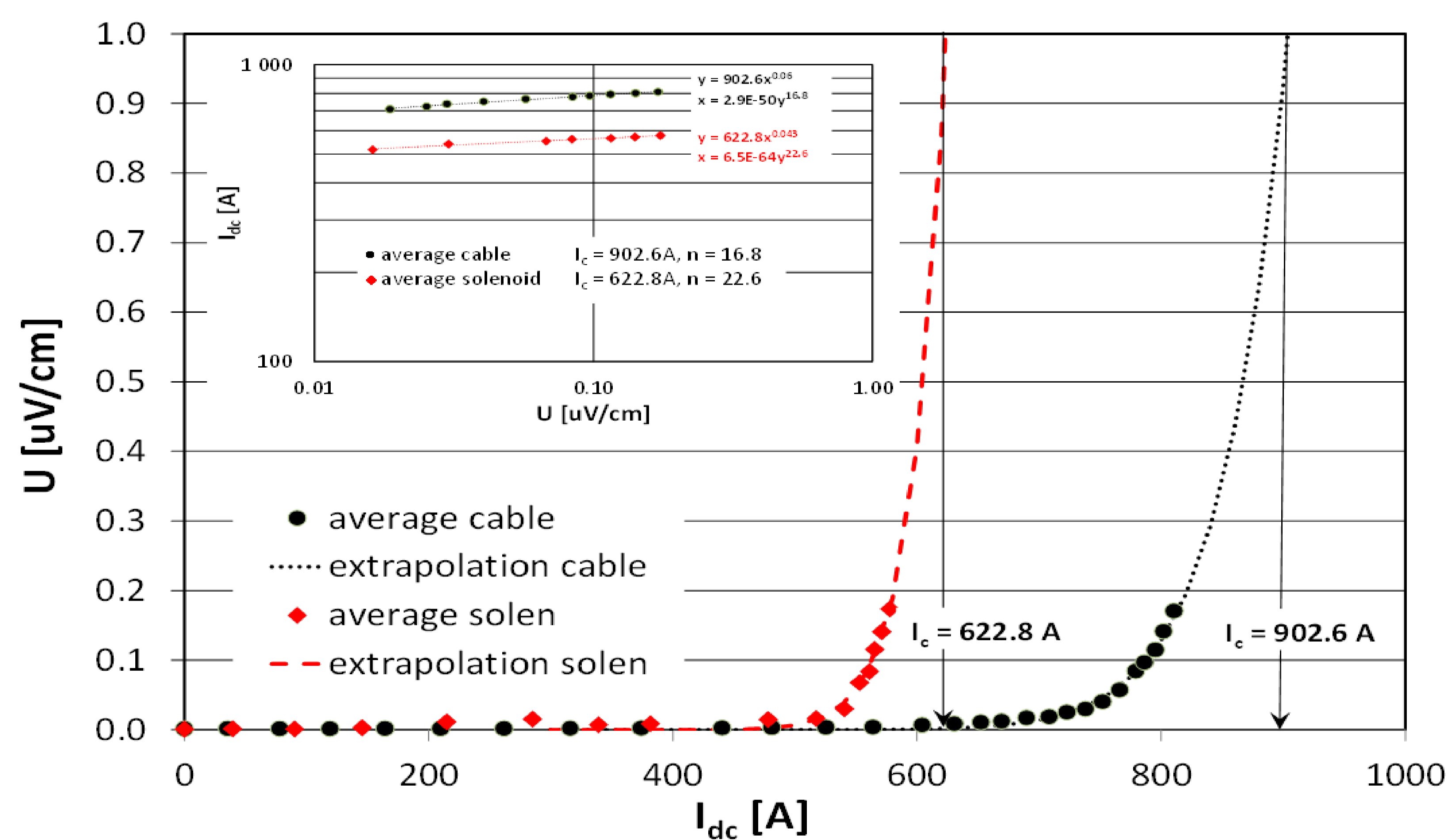
The dependences of the **tape voltages** on dc current flowing in the **tape** for cable and solenoid as well. Fitting and extrapolation of these dependences to the criteria  $1 \mu\text{V}/\text{cm}$  for four tapes are shown in insert



**Voltages measured on individual tapes in dependence on cable or solenoid current.** Curves without points represent average value from eight tape voltages

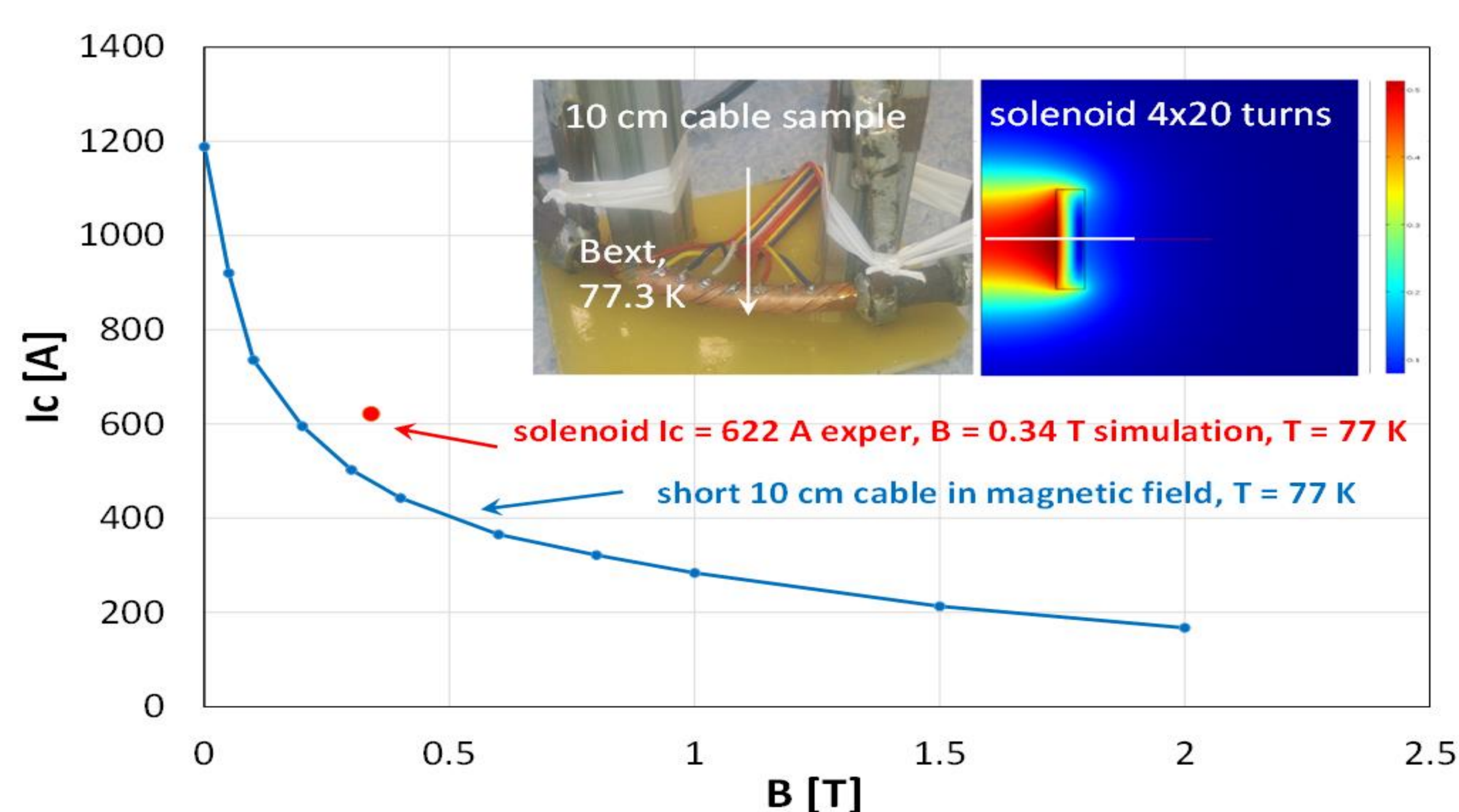


Dependence of averaged tape voltages on cable and solenoid current and their extrapolation up to critical current criteria  $1 \mu\text{V}/\text{cm}$



⇒ SOLENOID AND COIL  $I_c$  DECREASING WITH RESPECT TO 1240 A IS DUE TO SELF FIELD

**$I_c(B)$  dependence of short 10 cm cable sample compared with point for solenoid**  
 $I_c = 622 \text{ A}$  experimentally measured and  $B = 0.34 \text{ T}$  simulated for this current



Again ⇒ NO TAPES DAMAGE

Temperature dependence of solenoid critical current

Temperature [K]	77	72	68	66
Critical current [A]	622	948	1273	1359
Solenoid Magnetic field [T]	0.29	0.44	0.59	0.63

## Conclusion

- cabling machine for CORC® cable production was constructed
- 40m of CORC® cable produced with Cu tube as a cable core
- two layers, each containing 4 SuperPower tapes wound in one run
- solenoid with 4x20 turns and  $\phi$  out/in = 18/12 cm was made
- no tape damage occurred neither at cable nor solenoid production
- solenoid critical current reached 1360A/66K (0.63T) ~ 111A/mm<sup>2</sup>