**Functions of flexible PCB**:
- To interconnect the detector (50 mK) to the cryo-electronics (2.5 K) via an interconnection plate (100 µm).
- To implement the 24 integrated circuits of the pre-amplifying and multiplexing cryo-electronics.

**Features**:
- A thermal gradient zone (50 mK to 2.5 K) with superconducting tracks, and a constant temperature zone (2.5 K) with coppered superconducting tracks.
- In thermal gradient zone 552 tracks, width: 15 µm; space: 20 µm.
- In constant temperature zone 25 bus width: 120 µm; space 100 µm.
- An interconnection; at input side, 552 wire bonding pads (pitch 80 µm in 2 staggered columns = pitch 40 µm); at output side, a 5 points SMD Nano-D connector (23 mm width).

**Flexible PCB dimensions**:
- Total depth: 34 µm (~8.5 K).
- Critical resistance at the conductor: 105 mA at 4.2 K.
- Critical resistance at the conductor: 31.5 mA at 4.2 K.
- Critical resistance at the conductor: 10.5 mA at 4.2 K.
- Critical resistance at the conductor: 5.25 mA at 4.2 K.

**Variants**:
- **Variant 1**:
  - Tracks width: 300 µm.
  - Total thermal conduction: 1.45E-07 W/K.
  - Critical current: 105 mA at 4.2 K.

- **Variant 2**:
  - Tracks width: 90 µm.
  - Total thermal conduction: 6.08E-08 W/K.
  - Critical current: 31.5 mA at 4.2 K.

- **Variant 3**:
  - Tracks width: 30 µm.
  - Total thermal conduction: 2.95E-08 W/K.
  - Critical current: 10.5 mA at 4.2 K.

- **Variant 4**:
  - Tracks width: 15 µm.
  - Total thermal conduction: 1.77E-08 W/K.
  - Critical current: 5.25 mA at 4.2 K.

**Geometrical dimensions** (for variant 2):
- Thermal gradient zone: Width 80 µm, Space 80 µm.
- Constant temperature zone: Width 350 µm, Space 200 µm.

**Results**:
- Critical resistance at the conductor is ~2.5 K, i.e. very close to that of the massive niobium (9.3 K). This excellent result is due to an improvement of the quality of the metal deposition.

**Critical current**:
- For wires measurement of the electrical resistance of tracks, from one side of the flexible PCB to the other, when the temperature is varying (in both directions).
- For the first realization (i.e. the monolayer flexible PCB), the critical temperature measured was ~8.5 K.
- For the second realization (i.e. the multilayer flexible PCB), the critical temperature is ~9.2 to 9.2 K, i.e. very close to that of the massive niobium (9.3 K).

**Measurements**
- **Thermal conductivity**:
  - The Variant 2 of the multilayer flexible PCB as been measured between a low temperature of 50 mK and a high temperature varying from 800 mK to 5 K (see plot at left).
  - For the moment, the measure is not absolute, but it can be compared to the conductivity of a Manganin wire (length: 12 cm, diameter 0.13 mm) - both conductivities are comparable.
  - An absolute measurement will be performed very soon.

- **Residual-resistivity ratio (RRR)**:
  - It has been measured to ~15, which indicates a quite good metals deposition (it has doubled from first to second realization).

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**First realization: monolayer flexible PCB with chips on flex**

**Second realization: multilayer flexible PCB for shielded interconnections**