

# **MATERIAL SCIENCE CHALLENGES FOR ILC CAVITIES**

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## **Abstract**

Fine grain high purity niobium has been the material of choice for SRF cavities during the past several decades. The current high RRR niobium material specifications will be reviewed from the historical context. The specification discussions include grain size, ductility, yield strength, thermal conductivity and residual resistance ratio. The effect of each of these material characteristic on the process and performance of the cavities will be explored. The recent progress on the single crystal - large grain niobium technology and its potential impact on the cost and performance of ILC cavities will be discussed. The possible relaxation of specifications, such as residual resistance ratio and Tantalum content will be presented from the perspective of reducing the ILC cavity fabrication costs with same performance levels. Further, a new QA step based on the measurement of critical magnetic field of niobium will be proposed.

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