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C1Or2B-04: Cryogenic system configurations to cool superconducting radio frequency cavities at 2 K

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Any upgrade of the existing Relativistic Heavy Ion Collider (RHIC) to an electron-ion collider (eRHIC) at Brookhaven will employ superconducting radio frequency (SRF) cavities. These SRF cavities will be used to accelerate the electron beam in the new machine. External and internal mechanical, acoustic, electrical excitation sources, typically referred to as microphonics, cause disturbances to the SRF cavity's shape leading to detuning of the cavity. This study explores system configurations that can eliminate any flow induced microphonics, giving rise to a relatively quiet 2 K system. In addition to this, the paper also discusses various possibilities in intercepting heat at higher temperatures so that the total heat to be removed at 2 K is minimized. Effects of these considerations on cryomodule design are also discussed.

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