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10.15 Improved Design of Local Oscillator Optics System For Electron Cyclotron Emission Imaging On J-TEXT

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A new electron cyclotron emission imaging (ECEI) which contains two 16-antenna arrays is being developed on J-TEXT. The mixers in the same antenna array will be driven by the same microwave source. So an optics system is needed to expand the point source to an elongated line source. A traditional spherical local oscillator (LO) optics used to be designed to couple the LO signals and RF power into 16 vertical antennas. There are many limitations which include but not limit to: the driving power to the mixers of the edge channels, the collimation of the LO signal, the restricted optical path length, and so on. Therefore the traditional spherical LO optics on J-TEXT has some modification based on these questions. In addition, an advanced aspheric lens called Powell lens is employed to supersede the traditional one. Powell lens optics not only has the same advantages of traditional spherical LO optics, but also realizes the uniform distribution of LO power on the antennas. The length from LO source to antenna arrays is about 1.1m. And a new 3-pieces Powell LO optics which improves the robustness of 2-pieces Powell LO optics will be introduced. Furthermore, a presentation for simulation results and comparison of these LO optics will be given in this paper.

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