Abstracts

The Electron Cyclotron Maser--An Historical Survey

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It has taken nearly twenty years for practical development of the electron cyclotron maser. The initial theoretical notions were put forward by R. Q. Twiss in 1958, but the first clear experimental demonstration did not take place until 1964. Today, in the USSR, these devices are being built which deliver kilowatt-level CW power at submillimeter wavelengths with high efficiency. This paper traces these developments. After the first decade, Western device development became rather somnolent, and the initiative passed to the Soviet scientists. But a healthy resurgence of interest is now growing universally, due to a number of factors including device potential in practical systems. It has been shown recently that the cyclotron maser mechanism can explain a wide range of observations on intense relativistic electron beams, including the generation of gigawatt bursts. Furthermore, theoretical interest is again growing, especially as regards the nonlinear behavior of the interaction.

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