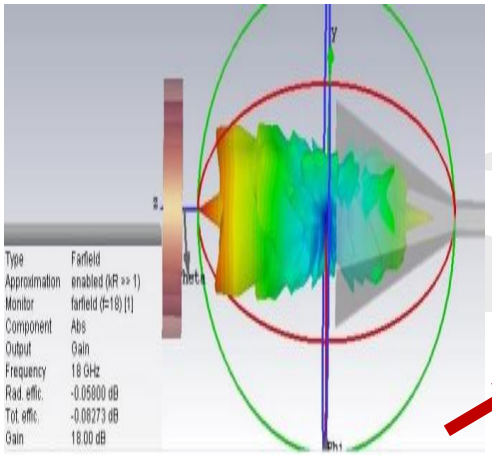
Dielectric Integrated Guide (DIG) Based Solutions for Sub-THz

Nagendra Prasad Pathak
Professor & Head
Department of Electronics and Communication Engineering

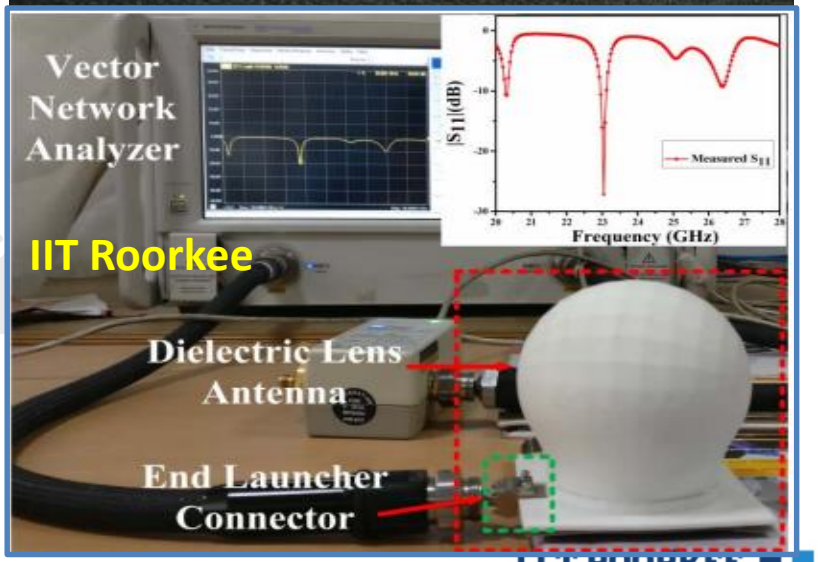
Motivation: Why dielectric integrated guides (DIG) based solutions for Sub-THz

- Immense potential for use of low cost technology specifically for developing nations
- Development in rural areas (e.g. in India) can be accelerated with the introduction of e-agriculture, e-learning, e-governance, e-banking, e-healthcare, e-commerce
- With the usage of DIG based technology, employment opportunities in developing nations can be boosted
- Dielectric integrated guides can also be used to built subsystems as well as systems up to the frequency range of 30 GHz to 500 GHz using semiconductor chips, low cost polymers and additive manufacturing techniques

DIG based millimetre wave solutions

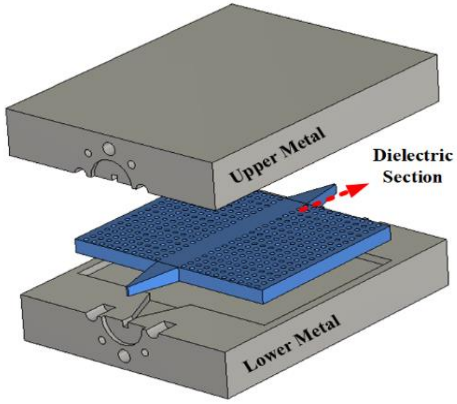


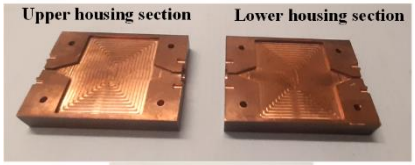
3D printed flat lens

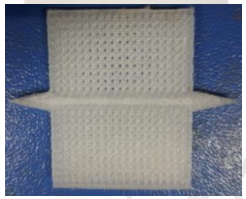


DIG based Sub-THz transceiver (Patent applied)

Back-to-Back Transition







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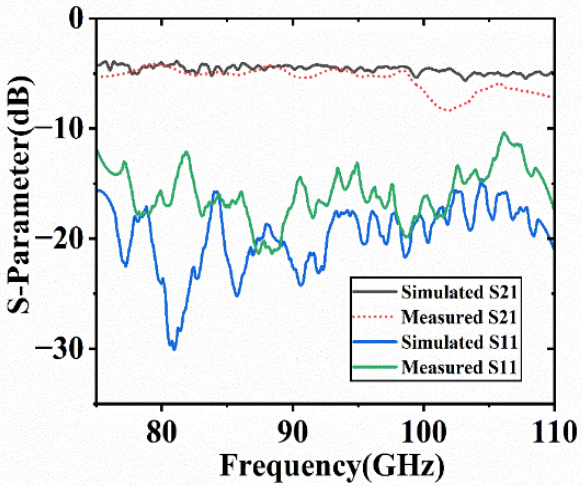
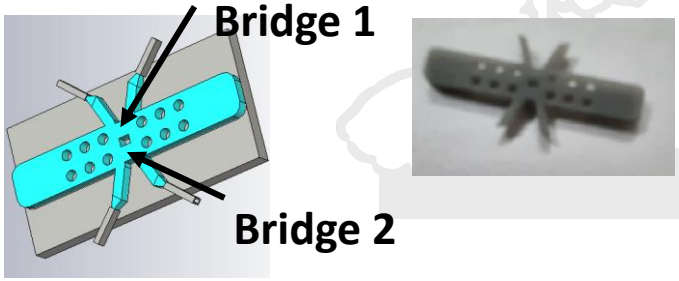


Coupler



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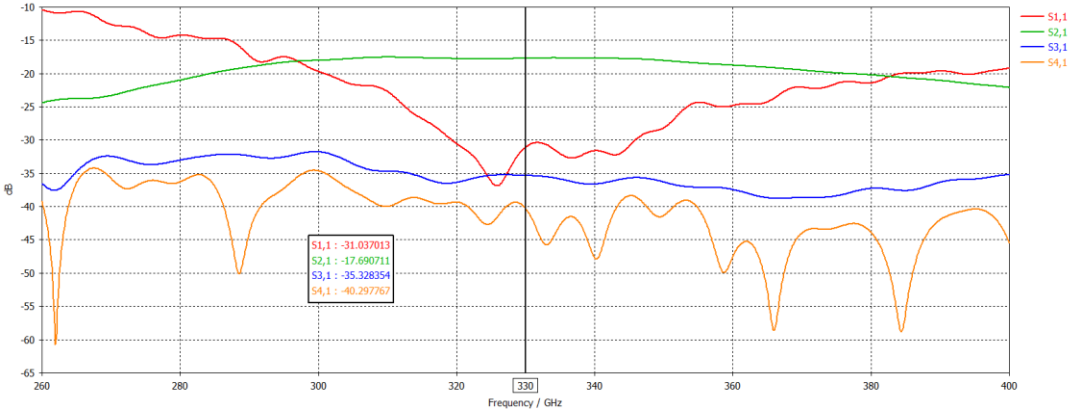
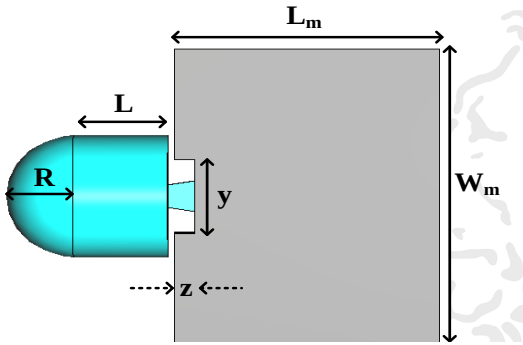
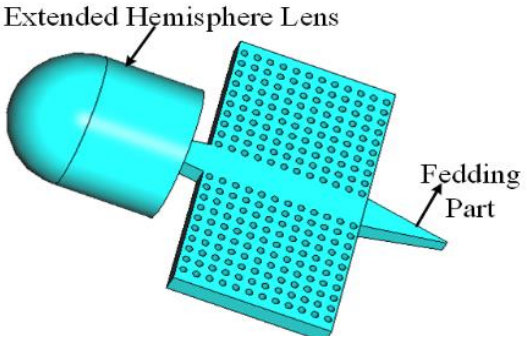


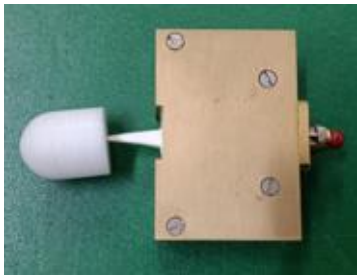
A. K. Baranwal, Akhilesh Mohan and N. P. Pathak, "A SYSTEM AND METHOD OF TRANSITION FROM RECTANGULAR WAVEGUIDE TO PERFORATED H GUIDE" Indian Patent Journal No. 23/2023 dated 09/06/2023. Application Number 202311031176, (Published).

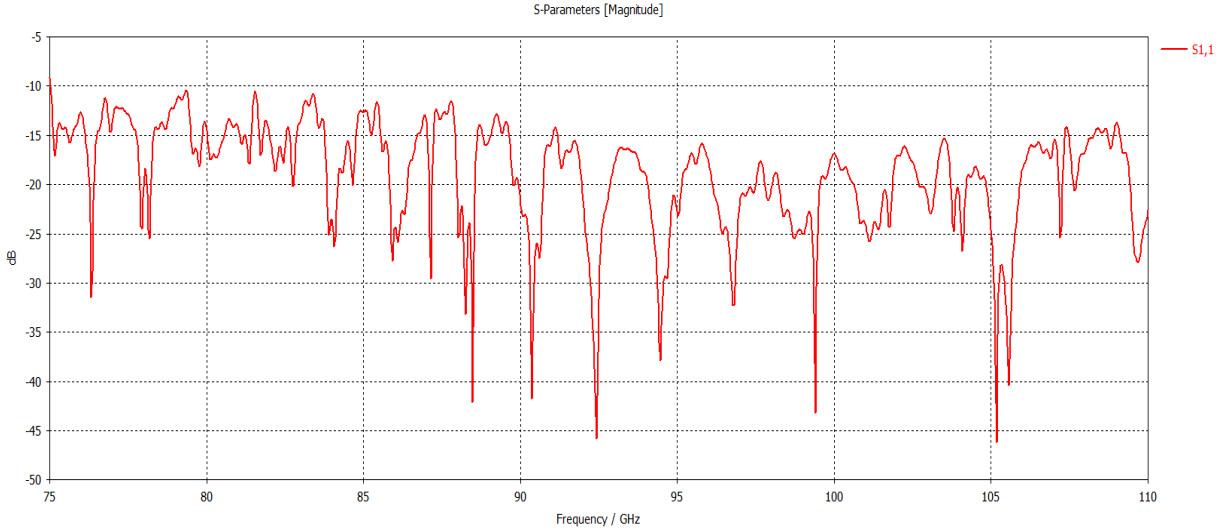
DIG based high gain lens antenna

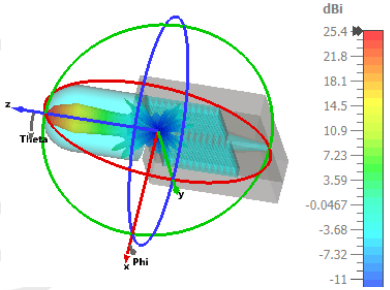
- mm-wave communication suffers path loss, hence we required a very high gain for such a higher frequency
- To overcome this problem, we integrated the extended hemisphere dielectric lens with a taper radiating rod, and a very high gain is achieved





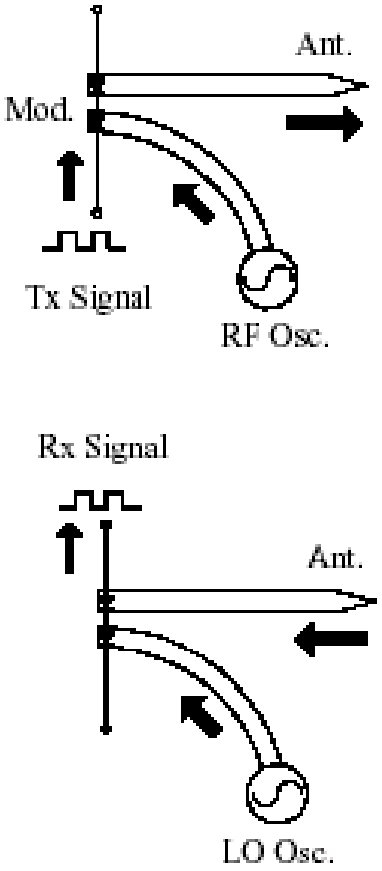


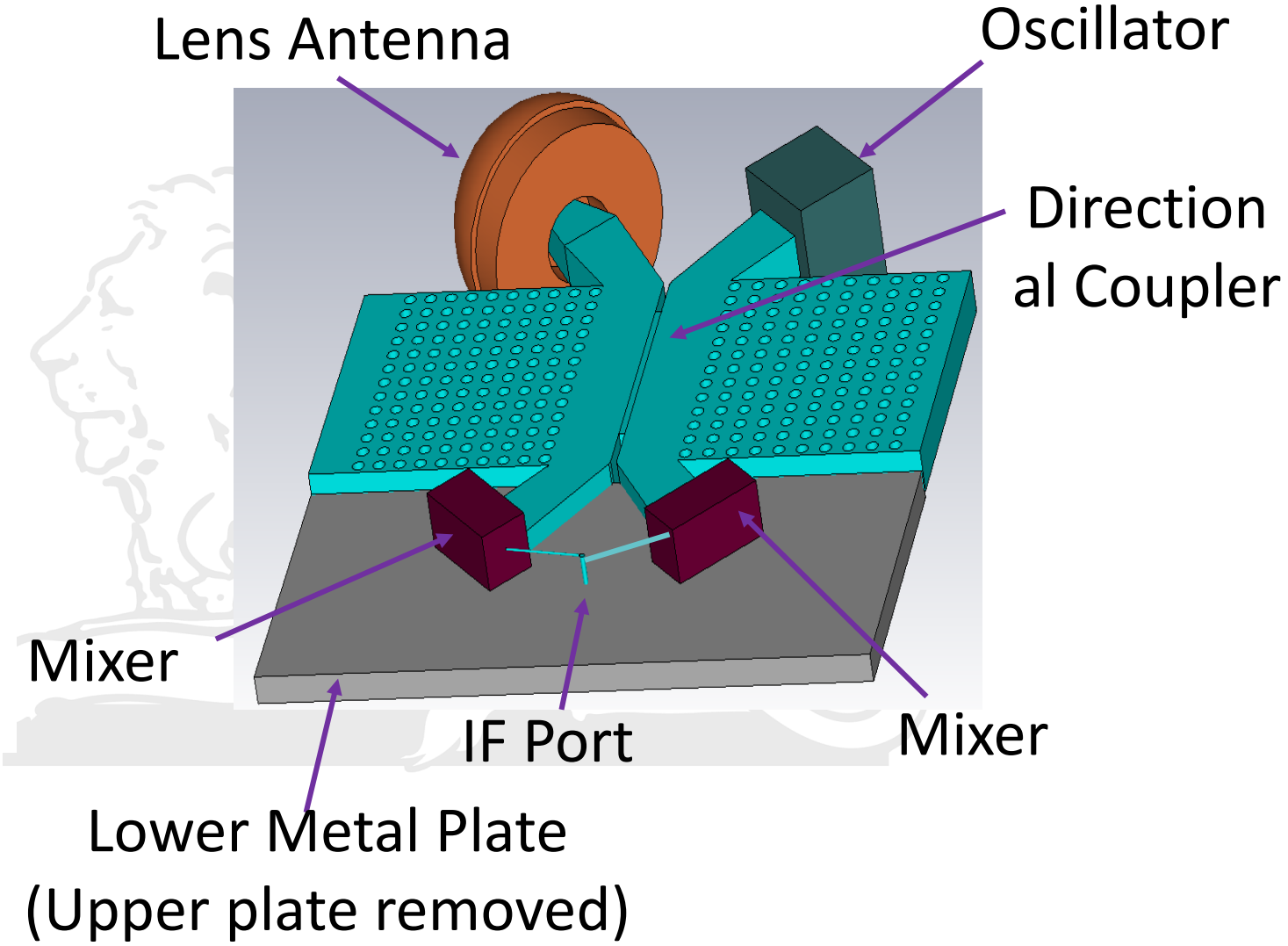




Gain– 25.4dBi
Radiation Efficiency – 95%

Sub-THz transceiver employing the concept of DIG





Potential Impact in Telecom Industry/Commercialization Strategy

- Indigenous low cost and affordable technology for 6G and beyond applications using 3D printing/ machining will not only provide low cost solution for our telecom sector, but it will also open an enormous opportunity for small and medium scale industries to setup their manufacturing units

- This will also reduce our over dependence on semiconductor chip fabrication industries.

THANKS