ETH zürich

Master / Semester Thesis

Ultra-Fast Beam Steering

– Millimeter Wave Antenna and Array Design –

Vision and Future Application

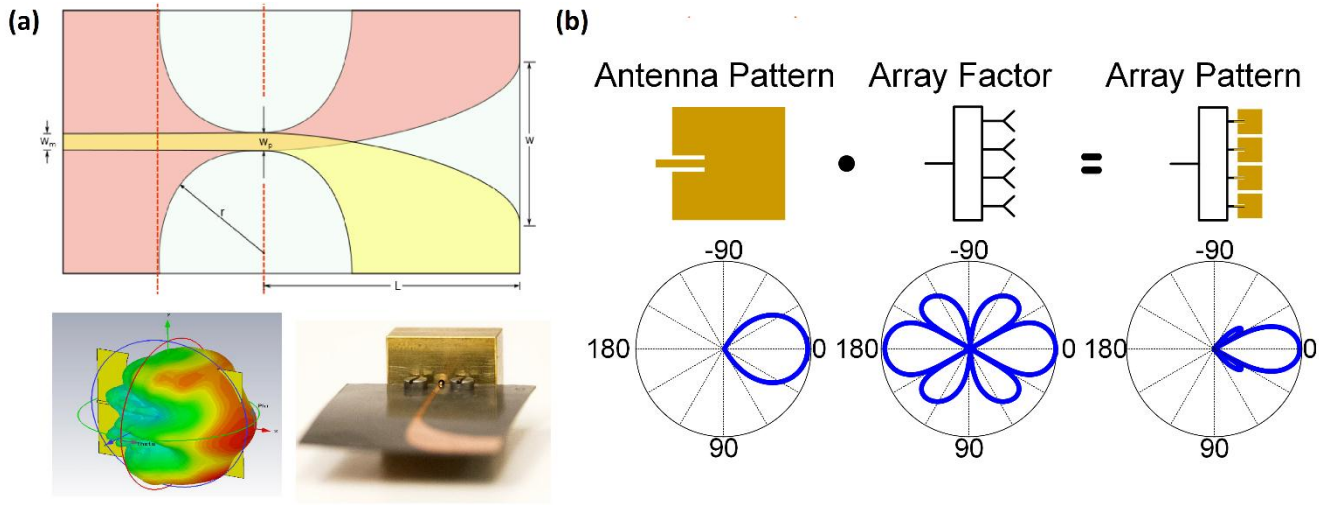
Next generation of wireless networks (WiGig) will rely on 60 GHz carrier and support data transmission up to 7 Gbit/s. To increase the bitrate further and more importantly the efficiency and reach of such wireless systems, highly directive antennas providing beam steering capabilities will be required. To build such antenna, fully photonic based solutions offer promising alternatives to electronics.

Type of Work

Theory, Simulation, Fabrication & Characterization

Requirements

Knowledge in field propagation and high frequency techniques & interest in wireless system and field propagation is advantageous.



(a) Vivaldi antenna. For the first demonstration of our ultra-fast steerable antenna system we have used custom made Vivaldi antenna. To increase the bitrate, the reach, and the efficiency for the next demonstrations, new antennas will have to be design and optimized for various frequency bands. (b) In a second step, the antenna will be put into an array. A phase array is a combination of multiple antenna leading to higher gain and higher flexibility.

Thesis Description

In this thesis, you will have to design antennas for millimeter wave applications. The target frequencies are 40, 60 and 90 GHz. The devices will be fabricated and characterized in our anechoic chamber using photonics based measurement systems. To enhance the antenna gain in one direction, the antennas will be combined into a phased array antenna (PAA). A PAA will provide higher gain and therefore increase the performances of the system. Depending on your interest, the focus of the work could be on the simulation, fabrication or characterization.

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