



### Motivation:

In order to achieve Tbit/s communication links, like for the Open6GHub project, broadband transceiver frontends are needed. For bandwidths up to 100 GHz (in the H-Band) are desired. There are several broadband active and passive components necessary like mixers, amplifiers and couplers. Key component especially for the modulating of signals are IQ-mixers, also balanced mixers and amplifiers are important components. In order to design those broadband 90°-Hybrid and 180° coupler are needed. For example in a balanced IQ-mixer several 90°-Hybrids and 180°-couplers are needed. Those couplers can differ strongly depending of the frequency range.

### Goals:

- Design of a broadband Transceiver consisting of broadband components
- Bandwidths of up to 100 GHz
  - IF...>0 GHz – 90 GHz
  - RF...250 GHz-350 GHz
  - LO...240 GHz – 260 GHz
- With different mixer variations
  - Distributed mixer to cover the whole H-band
  - Splitted band mixer where two mixers cover a part of the band
  - IQ-mixer
  - IR-mixer
- With different amplifier variations
  - Distributed amplifier to cover the whole H-band
  - Balanced amplifier

### Tasks:

- Investigation of different 90° and 180° passive coupler concepts
- Investigation and comparison of coupler technologies performance in the 35nm InGaAs mHEMT IAF Technology
- Design of 90° and 180° couplers for the H-band (220-330 GHz) and for 60-150 GHz.
  - Comparison of different topologies
- Design in the Fraunhofer IAF 35nm mHEMT technology

