

**Master 2019**

**Onur Can**

**Physical-Layer Security: Algorithms for FDD Key Generation.**

***ABSTRACT - Masterthesis***

This thesis is a follow-up work of an M.Sc work of Navdeep Singh, who investigated using MUSIC spectra for key generation. He was able to show that Directions of Arrival (DoA) read from the maxima of the MUSIC spectra were roughly identical for both transmission directions, i.e., from Alice to Bob and Bob to Alice. In addition to the MUSIC algorithm, we employed also the ESPRIT algorithm and made a comparison for a better performance judgment. Applying different information theoretic criteria, we now estimated the number of actually impinging signal components (waves).

We performed measurements using circular and linear arrays that we implemented together with a network analyzer to obtain S-parameters. Each measurement was based on forward and backward channel measurements using a sufficient separation between the antenna array and a single dipole counterpart. The antenna locations in the array were implemented by stepwise movements, either rotating the circular array or by a linear movement in case of the linear array. We programmed using MATLAB and Arduino IDE to control the movements and obtain the related measurements.

After performing various measurements, we compared forward and backward channel results. We managed to obtain reliable estimate of the number of signal components and got closely matching results with MUSIC and ESPRIT.