



# KOLLOQUIUM

Institut für Elektrotechnik, Elektronik und Informationstechnik

## **Towards a Circuit Theory of Communications**

**Prof. Josef A. Nossek, Dr.-Ing. Michel Ivrlac**

Lehrstuhl für Netzwerktheorie und Signalverarbeitung, TU München

**Donnerstag, der 18.12.2008, 16<sup>30</sup> Uhr (Sondertermin)**

Cauerstraße 7/9, Hörsaal H5

**Diskussionsleitung: Prof. Dr.-Ing. J. Huber**

The high level of abstraction, which is taken by information theory makes it a very versatile and powerful tool for the analysis and optimization of a wide variety of communication systems. But information theory has no concept for the flow of energy that accompanies the flow of information. Therefore, some important aspects of communication like transmit power or noise covariance can by no means straightforwardly be mapped from the information theoretic context to a physical scenario. We introduce an effective method to complement information theory with such a mapping by applying classical circuit theory. This allows correct assessment of the energy flow in a communication system and thereby enables an information theoretic analysis and optimization which is consistent with the underlying physics of the communication system under investigation. After developing appropriate circuit theoretic channel models the potential performance of multi-antenna communication systems will be analyzed. Besides the study of channel capacity, we also develop some insight into receive and transmit antenna gain, super-directivity, super-gain and super-resolution.