

# URSI Commission B: Fields and Waves

## The main interest of Commission B

- fields and waves
- encompassing theory
- analysis
- computation
- experiments
- validation
- applications

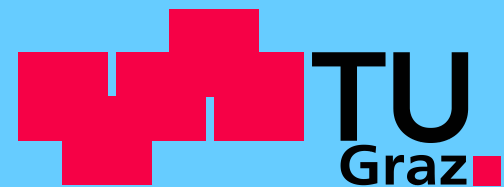
**Areas of emphasis:** Time-domain and frequency-domain phenomena; Scattering and diffraction; General propagation including waves in specialized media; Guided waves; Antennas and radiation; Inverse scattering and imaging.

*Union Radio-Scientifique Internationale*

*International Union of Radio Science*



*Erich Leitgeb*



Graz University of Technology

# Department of Communications and Wave Propagation at TU Graz

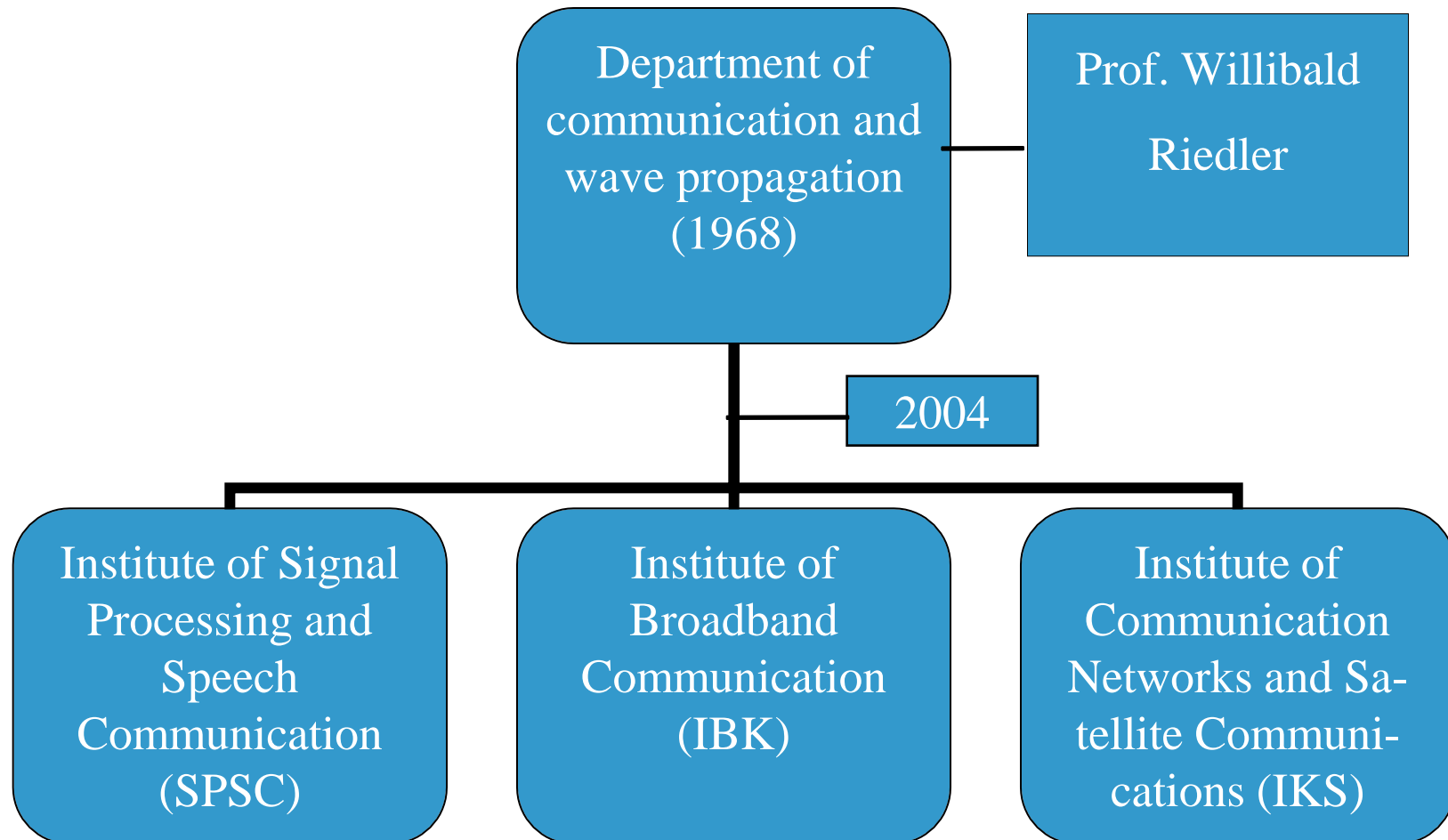
was founded in 1968 by Prof. Willibald Riedler

International co-operations (ESA etc.) and local synergies with Dep. of Applied Space Research (at Austrian Academy of Science) and Joanneum Research

- *Prof. Riedler retired in October 2000*
- *Since 10/2000 three positions for a full professor at the Department of Communications and Wave Propagation were available (3 institutes planned)*
- *Since 1/2004, the large Dep. was splitted into 3 institutes*
- *Since 2/2010, an additional institute, the Institute for Microwaves and Photonic Engineering (IHF)*



# Structure of the Department of Communications and Wave Propagation



# Research Groups at the Institute for Broadband Communication (IBK)

Since 2010 a new  
institute at TU Graz

Institute of  
Broadband  
communication

Institute of  
Microwaves and  
Photonic  
Engineering (IHF)

Optical Com.  
(OptiKom)  
Led by  
Prof. Erich Leitgeb  
(2011 IHF)

Radar /  
Microwave  
Led by  
Prof. Walter Randeu  
(2011 IHF)

Audio-Technique  
/ Acoustic  
Led by  
Prof. Gerhard Graber  
(2011 SPSC)

# Research at the Department of Communications and Wave Propagation

At Graz University of Technology (TUG) the Department of Communications and Wave Propagation (INW) has been very active and **internationally renowned** in the areas of **wave propagation above 10 GHz**, **satellite transmission** and networking as well as **application of space technology** in the framework of European Space Agency (**ESA**) programs, **COST**, **EU** framework programs and research contracts by **industry** and international operators as a prime contractor or partner in international consortia.

These programs enabled the researchers to gain considerable expertise in the areas of advanced modulation and coding, satellite internetworking, multiple access schemes, free-space optics and fade-countermeasure techniques.

# Research group for Optical Communications at IBK / IHF

For Austria the research group for **Optical Communications** at IBK and since 2011 at IHF has experience in **Atmospheric Wave Propagation of RF and light** (including attenuation, turbulences and atmospheric effects) as well as its applications (including solutions of **Free Space Optics** in combination with other Communication technologies like **Fibre, RF / microwave** technology and **Wireless LAN**) for more than 15 years.

**Co-operations with local companies** (NXP, Infineon, EPCOS) exist in RF- and Near field Communications, RFID-, Mobile- and Wireless Technologies.

**National Synergies** with Department of Applied Space Research (at Austrian Academy of Science) and Joanneum Research (ESA projects like “Optical Feeder Links” etc.)

**International Conferences, Symposiums and Workshops** (CSNDSP 08 in July 2008, ConTEL 2011 in June 2011, COST IC0802 Workshop in June 2011); **Propagation Workshop in 2012, NOC 2013 and ICTON 2014 planned!!**



**COST IC0802: Propagation tools and data for integrated  
Telecommunication, Navigation and Earth Observation systems**



EU projects: SatNEx I  
and SatNEx II



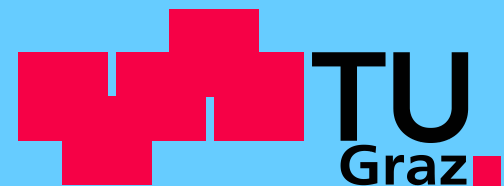
# Optical Wireless at TU Graz

More than 15 years experience in Free Space Optics  
(FSO, dt. Lichtfunk, optische Freiraumübertragung)

*Since 2000: Research Projects in Free Space Optics at the  
Department of Communications and Wave Propagation with  
**international co-operations***



**COST IC1101: Optical Wireless Communications**  
- An Emerging Technology (started on November 8, 2011,  
kick-off in Brussels)

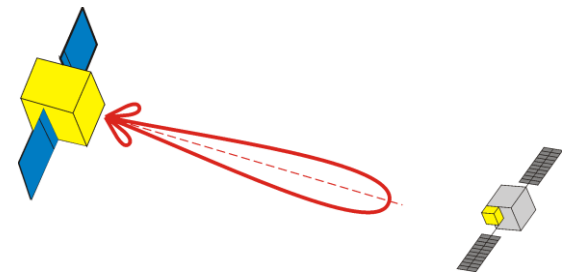


Graz University of Technology

# FSO Technology - Optical Wireless

## Advantages (Compared to other Communication Techniques)

- large Bandwidth
- Focusing / Narrow Beam (in RF Fresnel)
- Electromagnetic Compatibility
- minimising ‚electromagnetic Pollution‘
- protection of ‚wiretapping‘



## Main Disadvantage

the **local weather** (dense fog conditions)