



# The Development of IMS in Germany

Helko Borsdorf on behalf of the German IMS community



HELMHOLTZ  
CENTRE FOR  
ENVIRONMENTAL  
RESEARCH – UFZ

# Special Thanks to

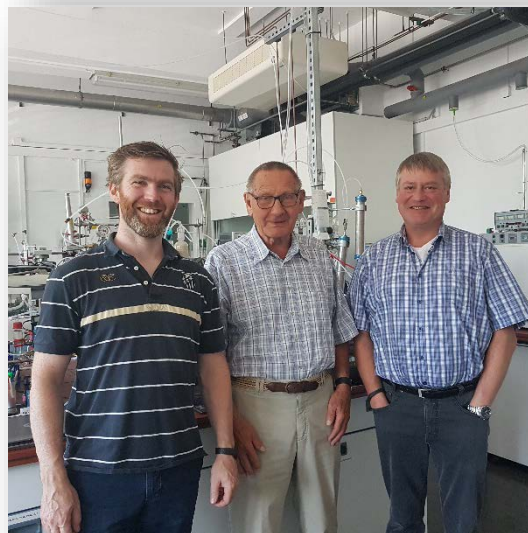
## Dr. Gerd Arnold

(First General Manager of Bruker Saxonia Analytik Ltd. and one of the developers of the first German ion mobility spectrometer)



## Dr. Johannes Flachowsky

(My precursor as Head of Division Mobile Analysis at the Helmholtz Centre for Environmental Research)



# Leipzig



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- ✓ is my hometown and a beautiful city
- ✓ was founded in 1015
- ✓ has the second oldest university in Germany (founded in 1409)
- ✓ is the origin of nearly all IMS activities in Germany today

# German Academy of Sciences at Berlin



## Central Institute for Isotope and Radiation Research Leipzig Institute for Applied Radioactivity Leipzig

**1968**

Procedure and Equipment for the Selective Detection of Ionized Toxic Compounds in Air and Other Gases

**1984**

Detector for Nerve Agents GZCA21

**1987**

First Ion Mobility Spectrometer

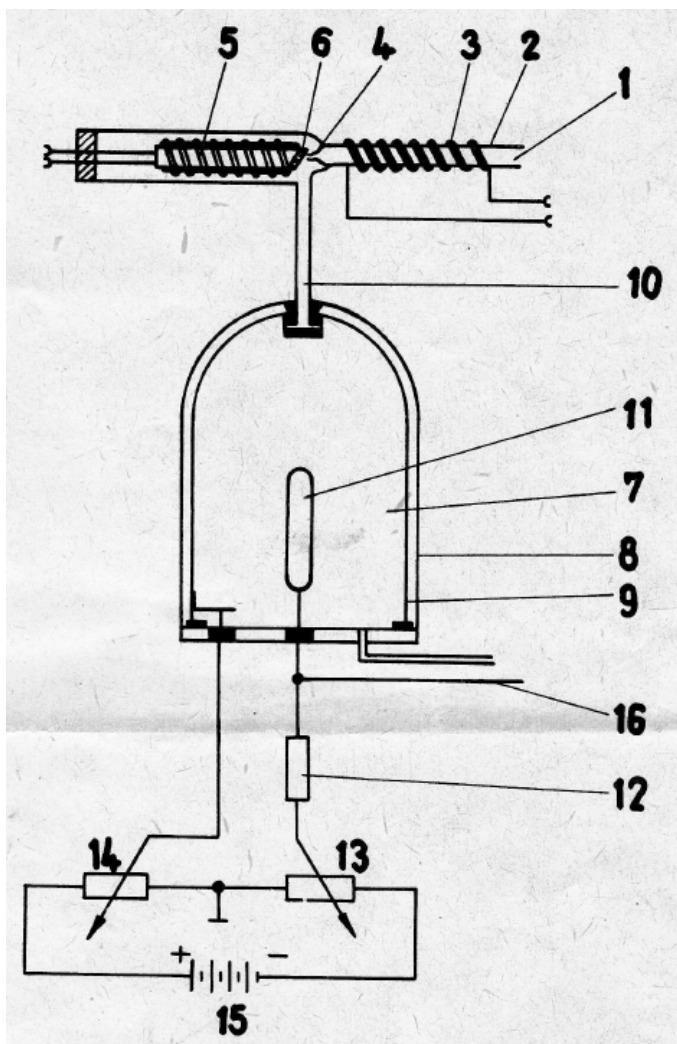
**1990**

Foundation of Bruker Saxonia



1968

## Procedure and Equipment for the Selective Detection of Ionized Toxic Compounds in Air and Other Gases



- Aerosols reduce the ionization current within a ionization chamber
- Formation of aerosols using metal oxides at 400°C
- Ionization chamber with  $^{63}\text{Ni}$  ion source
- Measurement of ionization current between electrodes (11) and (9)

1968

## Procedure and Equipment for the Selective Detection of Ionized Toxic Compounds in Air and Other Gases

<p>Союз Советских Социалистических Республик</p>  <p>Комитет по делам изобретений и открытий при Совете Министров СССР</p>	<p><b>О П И С А Н И Е ИЗОБРЕТЕНИЯ</b></p> <p>К ПАТЕНТУ</p> <hr/> <p>Зависимый от патента № —</p> <p>Заявлено 07.X.1969 (№ 1366553/26-25)</p> <p>Приоритет 19.XII.1968, № WP 42I/136781, ГДР</p> <p>Опубликовано 01.X.1971. Бюллетень № 29</p> <p>Дата опубликования описания 8.XII.1971</p>	<p><b>316263</b></p> <p>МПК G 01n 27/66</p> <p>УДК 543.275(088.8)</p>
Авторы изобретения	Иностранцы Ханс-Карл Боте, Петер Адлер, Иоханес Флаховски и Пауль Никлас (Германская Демократическая Республика)	
Заявитель	Иностранное предприятие «Феб Комбинат мес-унд Регелунгстехник Дессау» (Германская Демократическая Республика)	
<p><b>СПОСОБ НЕПРЕРЫВНОГО СЕЛЕКТИВНОГО КОЛИЧЕСТВЕННОГО ОПРЕДЕЛЕНИЯ КОНТРОЛИРУЕМОГО КОМПОНЕНТА</b></p>		

Patents in GDR: 19.11.1969 and in USSR: 08.12.1971

**1984**

## Detector for Nerve Agents GZCA21 (Alarm Device)



More than 1,000 detectors were produced from the national owned company (VEB) Junkalor Dessau for National People's Army (NVA) of GDR between 1988 and 1990.

**1984**

## **Detector for Nerve Agents GZCA21 (Alarm Device)**

**National Prize of the German Democratic Republic (2nd Class)  
for Science and Technology  
(1989)**

Awarded to a group of scientists from:

- *Central Institute for Isotope and Radiation Research Leipzig*
- *VEB Junkalor - Dessau*
- *Military-Technical Institute - Königswusterhausen*

for their work:

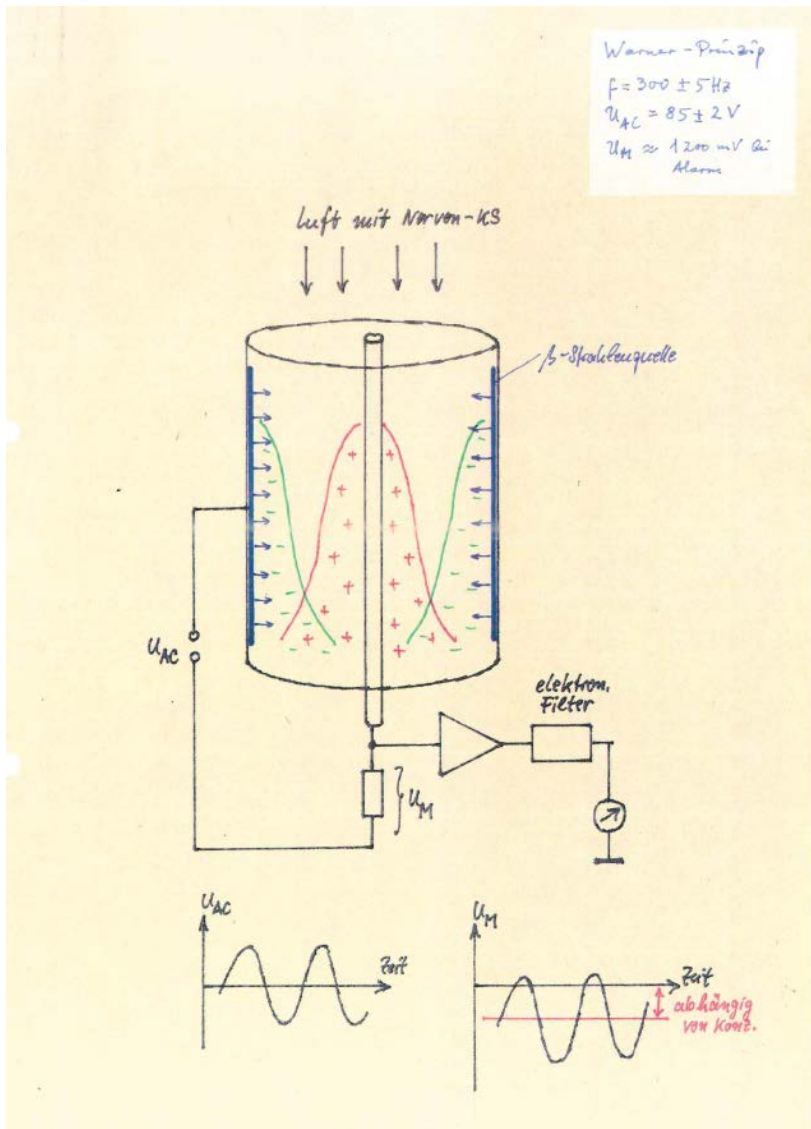
**Developing a highly selective method for the detection of trace amounts of  
harmful substances.**

**Hans-Rüdiger Döring, Jürgen Leonhardt, Joachim Adler, Gerd Arnold,  
Gerhard Voigt, Andreas Czepuck**



1984

## Detector for Nerve Agents GZCA21 (Alarm Device)



- Ionization chamber with tritium source
- Application of  $V_{ac}$  to ion source
- Baseline shift due to the presence of ions
- LOD for LD (Soman): 0,5 ppb
- Response time:  $\sim 0,2 \text{ min}$

**1987**

## First Ion Mobility Spectrometer



- The first German ion mobility spectrometer
- Tritium ionization source
- Self-made shutter grid
- Boxcar integrator

# Central Institute for Isotope and Radiation Research Leipzig

Hans-Rüdiger Döring  
Joachim Adler  
Gerd Arnold



Jürgen Leonhardt



Jörg-Ingo Baumbach



(Bruker-Saxonia: founded 1990)

(I.U.T.: founded 1992)

(1991 in Dortmund)



Martin Cohen and Roger Wernlund in Leipzig (2001)



The Bruker Team (1996)

**1990**

Contact to Dr. Dieter Koch as manager of BRUKER Franzen (Bremen) via Prof. Gerhard Matz (TUHH)

First meeting between H.-R. Döring, G. Arnold and D. Koch (June)

Foundation of Bruker Saxonia (1990-08-06)

German reunification (1990-10-03)

**2008**

Introduction of RAID XP as first commercial device with a non-radioactive ion source



AirSense GDA

Hans-Rüdiger Döring  
Joachim Adler  
Gerd Arnold

Joachim Stach

TU Hamburg-Harburg  
Gerhardt Matz



Centre for Environmental  
Research  
Johannes Flachowsky, Helko  
Borsdorf

**AIRSENSE**  
ANALYTICS

(founded 1996)

Andreas Walte

Wolf Münchmeyer



Bruker RAID 1 (1991)





Jürgen Leonhardt

Leibniz University Hannover

Stefan Zimmermann



Dräger IMS 2003

Drägersafety

(IMS transferred to Dräger 2002)

Wolfgang Bäther

IUT.

Institut für  
Umwelttechnologien  
GmbH

STEP

(founded 1993)

Werner Schüler

excitech

(founded 2013)

Jochen Wieser

Robert Mühling

Environics

BAM

Carlo Tiebe

IUT Technologies



Jörg's group at ISAS (2004)

Jörg-Ingo Baumbach



**isas** Leibniz-Institut für Analytische  
Wissenschaften

Exhaled Drug Monitor Edmon



(founded 2014)  
Wolfgang Vautz

Wolfgang Vautz  
Stefanie Sielemann  
Hartwig Schmidt  
Veronika Ruzsanyi

**BS** Analytik

(founded 2009)  
B. Braun Melsungen AG



(founded 1997)  
IMSPEX Diagnostics Ltd.



First German MCC-IMS for breath  
analysis from ISAS (2001/2002)

Rapiscan Systems  
University of Innsbruck

**Hamm-Lippstadt University  
of Applied Science**  
Stefanie Sielemann

## University of Duisburg-Essen



**Prof. Alfred Golloch**  
(IMS since 1999)  
Prof. Torsten Schmidt

Ursula Telgheder  
Achim Schumann



## University of Potsdam



**Friedrich Alexander**  
**University of Erlangen**  
Prof. H.-G. Löhmannsröben  
Carsten Illenseer

**University of Potsdam**  
H.-G. Löhmannsröben

Toralf Beitz  
Daniel Riebe

# IMS companies in Germany

excitech



IUT Technologies

BS Analytik



ION-GAS  
fast · robust · reliable

STEP  
Sensortechnik und Elektronik Pockau GmbH

STEP

SCHUMANN  
Analytics  
www.schumann-analytics.com

German map from <http://happylife.id/content/img>

# IMS research groups in Germany





# International IMS conferences in Germany

1997 The Bastei

Elbe River Cruise to Dresden, Tour of Dresden

2001 Wernigerode, Harz

Tour of The Brocken Mountain with an old railroad

2013 Boppard

Boat trip on the Rhine to Lorelei, visit to Castle  
and Medieval banquet with games at Castle

2019 Hannover

Hannover Adventure Zoo



# German IMS User Meeting

2006 Dortmund (Jörg Ingo Baumbach)

2008 Leipzig (Helko Borsdorf)

2010 Schwerin (Andreas Walte)

2012 Berlin (Carlo Tiebe)

2014 Essen (Ursula Telgheder)

2016 Hannover (Stefan Zimmermann)

2018 Reutlingen (Jörg Ingo Baumbach)

2020 Potsdam (Toralf Beitz)



# Conclusion

This was my personal opinion about more than 30 years experience in ion mobility spectrometry in Germany.

The German IMS community is so big that I couldn't mention them all.

It is fun to work in the German IMS community.

New developments in both, IMS and IMS-MS, lead me to expect a promising and an exciting future.

Thanks to the organizers here in Hannover.