

# Researchers Measure Atmosphere in Soccer Stadium

Field experiment in Mainz shows that concentration is crucial not only on the pitch

Scientists at the MPI for Chemistry analyze the air in sold-out Mainz stadium – and draw some interesting conclusions.

Dense crowds of soccer fans stream into Coface Arena in anticipation of an exciting game – the home match between Mainz 05 and VfL Wolfsburg. Two teams of researchers from the MPI for Chemistry are just as excited as they wait for the game to begin. Their goal is to analyze the air in the stadium using state-of-the-art trace-gas and aerosol measuring technology.

Thanks to the management of the Mainz Bundesliga clubs, Frank Drewnick and Jonathan Williams were able to deploy their measuring equipment in the stadium at the end of last season and collect data that they will use to find out whether and how the composition of trace gases and particles in the stadium air changes during a game.

## THE EFFECT OF SNACK STANDS

While the arena offered Drewnick and his doctoral student Peter Faber the perfect starting point for a research study on aerosols, it was the ideal opportunity for Williams and postdoc Patrick Veres to carry out a test: “We will soon be taking a new proton transfer mass spectrometer, known as PTR-MS-TOF for short, on a field campaign to Peru. We wanted to iron out any final growing pains in advance and test its capacity,” says Williams.

The concentration of small organic particles in the air in the stadium was surprisingly high during the match. Initially, several sources came into question: secondary aerosols, which could stem from organic vapors caused by the UV light of the floodlights, cigarette smoke, or particles from the snack stalls in the stadium, also known

as cooking aerosols. “Our analyses show only a very slight contribution from the first two sources. It seems cooking accounts for the dominant proportion,” explains Drewnick. Snacks sizzle at no fewer than 17 stands during

the game. In addition to producing the hearty snacks, the stands also generate tiny droplets of fat. These spread throughout the air, leading to a high concentration of organic particles in the stadium. “Our measurements speak



Measuring while the fans celebrate: Frank Drewnick and Jonathan Williams (right) in the Mainz soccer stadium

for the quality of the food in the stadium. Since we see hardly any increase in soot particles, the sausages aren't burnt," says Drewnick with a wink.

Jonathan Williams' new instrument also proved its own quality. "We were able to record very clear profiles for all the substances we measured in the air in the stadium. The PTR-MS-TOF thus performed very well in identifying different substances with a variety of rapidly changing sources," explains Williams.

### BREATH TEST FOR 31,000 PEOPLE

The shape of the curve for acetonitrile, a hydrocarbon that is produced, for example, when smoking cigarettes, proved interesting. Up until half time, the value matches that of CO<sub>2</sub>. Then, instead of falling in line with the CO<sub>2</sub> content, it reaches a maximum value during the half-time break. "Many people use half time as an opportunity to have a cigarette," concludes Williams. The researchers were also able to measure that plenty of beer was drunk in the stadium: the ethanol concentration in the stadium air at the end of the game was significantly higher than it was prior to kick-off.

Jonathan Williams hopes to use the data in the near future to be able to create a sort of "world emissions map" of the substances people exhale. It should show the concentrations of trace gases that are emitted in human exhaled air. Further measurements would certainly be necessary – always at locations where the emission effects of humans dominate. "The stadium was an ideal location for that," says Williams.

The field experiment in the stadium showed one more thing: after the game, which ended in a 0:0 draw, all concentrations rapidly declined again within less than half an hour. The stadium is thus equipped with an exemplary self-cleaning process – at least in terms of the air.

Anne Reuter

## Top-Notch Employer

According to a recent survey, the Max Planck Society is the most popular employer among biologists, chemists and physicists.

Where would you like to work after you graduate? This question was answered by 23,000 German students across all semesters and disciplines at a total of 107 universities. According to the Universum Student Survey 2012, the Max Planck Society is a favorite among young scientists. A total of 32.9 percent of students would like to work for Germany's most successful research organization, 20.4 percent for the Fraunhofer-Gesellschaft and 19.5 percent for Bayer.

Since 2008, the Max Planck Society has been the undisputed number one. And the MPS is in good company: among economists, Audi leads the way at 17.6 percent, just ahead of BMW (15.8 percent) and Porsche (13.3 percent). Among engineers, Audi again leads the field, with 24.5 percent – ahead of BMW (22.2 percent) and Siemens (23 percent). Computer scientists would prefer to work for search engine provider Google, which 32.5 percent of respondents named as their favorite employer, followed by Microsoft (21.3 percent) and Apple (17.8 percent).

Even among engineers and computer scientists, the Max Planck Society was able to position itself in the top 20 again this year. Among engineers, the research organization came in 18th, with 4.7 percent of all respondents, and it was ranked 15th in the area of computer science.



Company	2012 ranking
Max Planck Society	1
Fraunhofer-Gesellschaft	2
Bayer	3
BASF	4
DLR	5
Merck	6
Novartis Pharma	7
Siemens	8
Roche Diagnostics	9
Fresenius Medical Care	10
Henkel	11
Boehringer Ingelheim Pharma	12
Audi	13
Solarworld	14
Ratiopharm	15





## Award-Winning Family-Friendly Personnel Policy

The Max Planck Society has successfully passed an audit conducted by non-profit organization berufundfamilie GmbH for the third time and once again received a certificate for its family-friendly personnel policy. Now the next step is to implement the new voluntary undertaking, which is tailored specifically to the research organization, and to firmly embed the measures designed to promote a better work-life balance in the corporate culture.

The Max Planck Society is still the only research organization to be certified in its entirety. And it doesn't shy away from the steep costs involved: the evaluation carried out by specially trained and authorized auditors before the certificate is awarded is a comprehensive process that the company itself must pay for and support with a great deal of its own effort. "By doing this, we hope that we can sensitize all institutes to the importance of achieving a good work-life balance," says Secretary General Dr. Ludwig Kronthaler, explaining the Max Planck Society's commitment to this undertaking. The Society also hopes to enhance the appeal of the research organization at the international level, attract highly qualified employees, and increase employee motivation through better operating conditions.

The 2012 re-auditing process was based on the theme "consolidation" and included interviews with employees from different employee groups. The framework and culture of the family-friendly personnel policy were examined

and the results were reflected back to top management. After all, it's not enough to offer family-friendly measures; it is essential to also create an environment that enables employees to avail themselves of these measures without reservation. Otherwise, family-friendly policies are nothing more than lip service.

One of the objectives of the voluntary undertaking is thus to firmly instill an awareness of family issues in the management framework. This includes incorporating the issue of family and career in mandatory seminars on personnel management of managers, and specifically inquiring about the issue during staff appraisals and performance reviews. Communication between Administrative Headquarters and the institutes on the specific issues, for example during meetings of heads of administration, must be intensified and the relevant internal communication level in the Max Planck institutes expanded. Moreover, the positions of equal opportunities commissioners must be strengthened in the institutes. Other teleworking options must also be explored, and existing father role models presented as examples.

The Max Planck Society was one of 371 employers to be awarded a certificate for a family-friendly personnel policy. Throughout Germany, 998 companies, institutions and universities now carry the special logo. A total of roughly 1.9 million employees and 1.2 million students will benefit from the audit.

## Scholarship Amounts Standardized

Since July 1, doctoral grant holders at the Max Planck Society have been receiving a standard funding amount of 1,365 euros per month. This was approved by the Executive Committee at the Annual Meeting in Düsseldorf. "Aligning the guidelines governing support for junior scientists ensures that the maximum amount granted is binding and applies as the standard rate at all institutes," em-

phasizes Peter Gruss, President of the Max Planck Society. The arrangement applies both to new funding and to the more than 2,200 junior scientists who are already receiving a doctoral grant. An additional allowance of up to 100 euros per month will also be paid for health insurance. PhDnet welcomes the decision, as it means that scholarship holders and doctoral students with a

funding agreement are "more or less financially equal at all institutes."

For MPS President Peter Gruss, grants are a proven tool for funding graduates in Germany and abroad: "They enable us to attract more junior talent for doctoral studies in Germany. It was important for us to safeguard the value of the Max Planck grant so that it is also recognized as a model internationally."