

## Publicaties 2022

SBO:

- Keqiu Zeng, Jelena Popovic, Gert Rietveld, Saijun Mao, Hui Yu, Ligu Wang, Kun Liu and Zhiding Zhou,  
“Resolution Improvement in a High-Power Magnetic Resonance Imaging Gradient Power Amplifier”,  
IEEE Transactions on Power Electronics, vol. 37, No. 9, pp. 10594 – 10608 (2022).  
DOI: 10.1109/TPEL.2022.3162385
- Keqiu Zeng, Saijun Mao, Gert Rietveld, Jelena Popovic, Hui Yu, Ligu Wang, Kun Liu and Zhiding Zhou,  
“High-precision control method for high-power MRI gradient power amplifiers”,  
IEEE Transactions on Power Electronics, vol. 37, pp. 9035 – 9046 (2022).  
DOI: 10.1109/TPEL.2022.3155686
- Lisheng Wang, Wenbo Wang, Raymond J.E. Hueting, Gert Rietveld, and Jan Abraham Ferreira,  
“Review of topside interconnections for wide bandgap power semiconductor packaging,”  
IEEE Transactions on Power Electronics, vol. 38, no. 1, pp. 472 – 490 (2022).  
DOI: 10.1109/TPEL.2022.3200469
- Lei Wang, Wenbo Wang, Raymond J.E. Hueting, and Gert Rietveld,  
“Multi-physical Design of a Wave Spring Connector for a Highly-Reliable GaN Power Module,”  
2022 IEEE International Power Electronics and Application Conference and Exposition (PEAC), pp. 1 – 6 (2022).  
DOI: 10.1109/PEAC56338.2022.9959435
- Seyedreza Azizighalehsari, Prasanth Venugopal, Deepak Pratap Singh, and Gert Rietveld,  
“Performance Evaluation of Retired Lithium-ion Batteries for Echelon Utilization,”  
IECON 2022 – 48th Annual Conference of the IEEE Industrial Electronics Society, Brussels, Belgium, pp. 1 – 6 (2022).  
DOI: 10.1109/IECON49645.2022.9968496
- Maarten Appelman, Prasanth Venugopal, and Gert Rietveld,  
“Impact of Discharge Current Profiles on Li-ion Battery Pack Degradation,”  
2022 IEEE 20th International Power Electronics and Motion Control Conference (PEMC), Brasov, Romania, pp. 1 – 7 (2022).  
DOI: 10.1109/PEMC51159.2022.9962917
- Reyhaneh Eskandari, Prasanth Venugopal, and Gert Rietveld,  
“Advanced Battery Management Systems with Integrated Battery Electronics,”  
2022 IEEE 20th International Power Electronics and Motion Control Conference (PEMC), Brasov, Romania, pp. 1 – 7 (2022).  
DOI: 10.1109/PEMC51159.2022.9962868
- Sohaib Qazi, Prasanth Venugopal, and Gert Rietveld,  
“Comprehensive study of a hybrid electric ship for optimum onboard fuel consumption,”  
2022 IEEE 16th International Conference on Compatibility, Power Electronics, and Power Engineering (CPE-POWERENG), Birmingham, UK, pp. 1 – 6 (2022).  
DOI: 10.1109/CPE-POWERENG54966.2022.9880900
- Junyun Deng, Wenbo Wang, Prasanth Venugopal, Jelena Popovic and Gert Rietveld,  
“Knowledge-aware Artificial Neural Network for Loss Modeling of Planar Magnetic Components”,

2022 IEEE Energy Conversion Congress and Exposition (ECCE), Detroit, USA, pp. 1 – 6 (2022).

**DOI:** 10.1109/ECCE50734.2022.9947398

- Keqiu Zeng, Gert Rietveld, and Jelena Popovic, “Design of a Measurement System for Accurate Determination of Fast-Changing DC Currents up to 900 A”, 2022 Conference Precision Electromagnetic Measurements (CPEM), pp. 1 – 2 (2022).
- E. Houtzager and G. Rietveld, “Calibration of a precision IVD using a commercial digitizer”, 2022 Conference Precision Electromagnetic Measurements (CPEM), pp. 1 – 2 (2022).
- F. Mubarak, F. Munoz, F. Hussain, G. Rietveld, and M. Spirito, “Methods for Precision RF Probing in On-wafer Measurements,” 2022 Conference Precision Electromagnetic Measurements (CPEM), pp. 1 – 2 (2022).
- I. Tannemaat, E. Schenkel, G. Rietveld, A. Gallastegi, and M. Achterkamp, “System Accuracy Evaluation of Metering Application based on Optical Current Transformers and IEC 61850 SV Static Energy Meters,” CIGRE 2022 session, Paris, France, pp. 1 – 10 (2022).
- Marjan POPOV Nidarshan KUMAR, Aleksandar BORIČIĆ, Matija NAGLIČ, Ilya TYURYUKANOV, Marko TEALANE, Jose RUEDA, Arjen JONGEPIER, Ernst WIERENGA, Maarten VAN RIET, Oleg BAGLAYBTER, Gert RIETVELD, Jorrit BOS, Mart VAN DER MEIJDEN, Danny KLAAR, and Peter PALENSKY, “Synchrophasor-based Applications to Enhance Electrical System Performance in the Netherlands,” CIGRE 2022 session, Paris, France, pp. 1 – 10 (2022).

## RESEARCH:

### CHEMIE

- European Metrology Network Energy Gases (EnergyGases)
  - Vision for a European Metrology Network for Energy Gases, *Environmental Research: Infrastructure and Sustainability*, Arul Murugan, Oluwafemi Omoniyi, Emma Richardson, Marcel Workamp and Annarita Baldan (<https://doi.org/10.1088/2634-4505/ac57f6>).
  - Lezing gehouden bij GAS Analysis 2022 (Mei 2022), de algemene ledenvergadering van EMN Smart Grids (Mei 2022), een evenement van IRENA (Juni 2022), NEWGASMET stakeholder workshop (Sep 2022) en specifiek lezing voor Hydrogen Europe/Hydrogen Europe Research Technical Committee leiders (oktober 2022).
  - Posterpresentatie op de gezamenlijke virtuele EURAMET-stand van de BIPM WMO Climate Action Workshop (september 2022).
- Metrologie voor herleidbare kwikmetingen (SI-Hg)
  - Project update CEN/TC264 WG8, 2 juni 2020, 14 april 2021, 26 oktober 2021 en 31 maart 2022, online en 17 november 2022 bij NEN in Delft.
  - Metrology of mercury measurement results in air, 28-01-2022, CEN/TC264 WG9, online.
  - Comparability of the measurement results for gaseous elemental mercury (GEM), Minamata online session, 1 maart 2022.
  - Protocol for SI-traceable measurement results of elemental mercury concentrations in air, GAS analysis conference, 19 mei 2022, Parijs, Frankrijk.
  - Metrology for traceable protocols for elemental and oxidized mercury concentrations, ICMGP 2022 – 25-29 juli 2022, virtueel, on demand presentation.

- Protocol for SI-traceable measurement results of elemental mercury concentration in air, ICMGP 2022 – 25-29 juli 2022, virtueel, presentation in special session organized by the SI-Hg project: Metrological traceability for mercury analysis and speciation.
- Kwikdamp traceerbaar naar SI! Themadag gasanalyse, VSL – Delft, 15 september 2022.
- Normen voor metrologisch herleidbare meetresultaten van kwikconcentraties in emissiebronnen, NEN-infomil dag, parallelsessie zeer zorgwekkende stoffen (ZZS), 4 oktober 2022, Utrecht.
- Metrologie voor isotooanalyses (Stellar)
  - Post op Stellar projectwebsite over het verkrijgen van de biomethaansamples <http://empir.npl.co.uk/stellarproject/news-events/>
  - Meeting the demand for isotopic carbon dioxide and methane gas reference materials for underpinning global observations. Gezamenlijke presentatie op de BIPM-WMO Climate workshop (september 2022).
- Metrologie voor Portable Emission Measurement Systems (MetroPEMS)
  - Deelname in MetroPEMS stakeholder committee call, maart 2022 en 3ort rac 2022.
  - MetroPEMS presentaties in de EURAMET TC Flow, 3ort race 2021 en mei 2022.
  - 4<sup>th</sup> ETH Conference on Combustion Generated Nanoparticles “MetroPEMS: Metrology for portable emission measurement systems. Project goals and preliminary finding”, [https://www.nanoparticles.ch/2021\\_ETH-NPC-24.html](https://www.nanoparticles.ch/2021_ETH-NPC-24.html).
  - Flomeko 2022, 19<sup>th</sup> Conference of IMEKO TC9 (Flow measurement), *Traceable uncertainty of exhaust flow meters embedded in portable emissions measurement systems*, 3ort rac 2022.
  - *Summary report on the current state-of-the-art of Exhaust Flow Meter (EFM) calibration procedures, including (i) its associated uncertainty for relevant carrier gases and (ii) its relation to on-road emission tests*, <https://zenodo.org/record/6624338#.Yq2yX3ZbxaQ>, MetroPEMS project deliverable.
  - *Artikelen over de ontwikkeling van de meetstandaarden voor PEMS zijn gepubliceerd op LinkedIn (VSL, MetroPEMS en PEMS groepen) en de VSL website (<https://www.vsl.nl/en/about-vsl/news/vsl-develops-gas-standards-portable-emission-measurement-system-pems>)*.
- Emissies van gevaarlijke stoffen uit bouwmaterialen in binnenlucht (MetriAQ)
  - Metrological generation of SI-traceable gas-phase standards and reference materials for (semi-) volatile organic compounds, de Krom et al. Meas. Sci. Technol., 34 (2023), 035018, doi: <https://doi.org/10.1088/1361-6501/aca704>.
- SI-herleidbare validatie van methodes voor biomethaan conformity assessment (BiometCAP)
  - The first Publishable Summary of the project published on the EURAMET website: <https://www.euramet.org/research-innovation/search-research-projects/details/project/protocol-for-si-traceable-validation-of-methods-for-biomethane-conformity-assessment>.

## ELEKTRICITEIT

- Verbetering bestaande faciliteiten HF
  - A Poster “VNA as a High Dynamic Range RF Power Transfer Standard” was presented at 2022 Conference on Precision Electromagnetic Measurements (CPEM 2022), December 2022, Wellington, New Zealand.
- Betrouwbare meting van supraharmonischen in het elektriciteitsnet (SupraEMI)

- H.E. van den Brom, R. van Leeuwen, G. Ye, D. Hoogenboom, G. Rietveld, D. Istrate, K. Kasri, A. Gallarreta, and D. de la Vega, "A comparison of the Light-QP method for (2 to 150) kHz emission measurements with the CISPR 16-1-1 method", submitted to CPEM 2022, Wellington, New Zealand
- S. Lodetti, P.N. Davis, D. Ritzmann and P.S. Wright, V. Khokhlov, J. Meyer, D. Istrate, H. van den Brom, R. van Leeuwen, A. Gallarreta, and D. de la Vega, "Comparison of household appliances voltage emissions to compatibility levels in the 2 kHz to 150 kHz range", submitted to CPEM 2022, Wellington, New Zealand
- S. Lodetti, P. Davis, D. Ritzmann, P. Wright, V. Khokhlov, J. Meyer, D. Istrate, K. Kasri, H. van den Brom, G. Ye, R. van Leeuwen, A. Gallarreta, and D. de la Vega, "Comparison of laboratory and grid measurements of 9 kHz to 150 kHz appliance emissions", submitted to AMPS 2022, Cagliari, Italy.
- Helko van den Brom, "A comparison of performance and results of measurement methods applied to a selection of domestic appliances with emissions in the (2 to 150) kHz range", SupraEMI final workshop, online, 6 April 2022.
- Gert Rietveld, "A comparison of the Light-QP method for (2 to 150) kHz emission measurements with the CISPR 16-1-1 method", CPEM 2022, Wellington, New Zealand.
- Ondersteuning voor een Europees Metrologie Netwerk op het gebied van Slimme Elektriciteitsnetwerken (SEG-Net)
- Abstract voor presentatie van het EMN SEG netwerk op de CIM conferentie, Lyon, 2023
- Gert Rietveld, "Overview of Smart Electricity Grids and their measurement Challenges," Oral presentation at the Excellence Training "Measurements and Metrology for Smart Electricity Grids", May 2022
- Gert Rietveld, "JNP SEG-net: Supporting the launch of the EMN SEG," Oral presentation mid-term review conference, June 2022, Paris, France.
- Gert Rietveld, "*European Metrology Network on Smart Electricity Grids: progress update*," Invited oral presentation APMP Energy Efficiency Focus Group workshop on "Measurement support for sustainable energy", November 2022.
- Gert Rietveld, "Measurement research challenges for Smart Electricity Grids," Invited oral presentation special session 2022 Conference on Precision Electromagnetic Measurements (CPEM 2022), December 2022, Wellington, New Zealand.
- Herleidbaarheid voor hoogfrequente metingen aan planaire componenten (TEMMT)
  - Djamel Allal, Faisal Mubarak, Thomas Flisgen, Xiaobang Shang, Gia Ngoc Phung, and Uwe Arz "Uncertainties of on-wafer millimeter-wave and THz S parameter measurements", in Proc. Of conference on precision electromagnetic measurements (CPEM), 2022, New Zealand.
  - Fabio Munoz, F. Mubarak, G. Rietveld, and M. Spirito, "Automatic On-wafer GSG-probe alignment using 2D cross-correlation", in Proc. Of conference on precision electromagnetic measurements (CPEM), 2022, New Zealand.
  - Faisal Mubarak, Gia Ngoc Phung, Uwe Arz, Isabelle Roch-Jeune, Guillaume Ducournau, Kamel Haddadi, Thomas Flisgen, Ralf Doerner, Djamel Allal, Divya Jayasankar, Jan Stake, Robin Schmidt, Gavin Fisher, Nick Ridler, Xiaobang Shang, "An Interlaboratory Comparison of On-Wafer S-Parameter Measurements up to 1.1 THz", in *IEEE Transactions on Terahertz Science and Technology*, under review, 2022.
  - Faisal Mubarak, "Measurement uncertainties of RF probes in traceable on wafer measurements", 2022-4-2, European Microwave Week, Workshop – Research in Power and S-parameters Measurements at EuMC mmWave and Terahertz Frequencies
  - Faisal Mubarak, "WP2: Traceable planar S-parameter measurements", 2022-3-24, Workshop, JRP TEMMT: European Measurement Capability & Coordinated European Network
- Metrologie voor energietransport (FutureEnergy)

- Experience on Performing Linearity Extension of Lightning Impulse Voltage Dividers up to 3000 kV, accepted for oral presentation in ISH2023 (27 August to 1 September 2023).
- Meettransformatoren voor power quality metingen (IT4PQ)
  - Gabriella Crotti, Yeying Chen, Huseyin Çayci, Giovanni D'Avanzo, Carmine Landi, Palma Sara Letizia, Mario Luiso, Enrico Mohns, Fabio Muñoz, Renata Styblikova and Helko van den Brom, "How Instrument Transformers Influence Power Quality Measurements: A Proposal of Accuracy Verification Tests", *Sensors* 2022, 22(15), 5847.
  - Helko van den Brom, "Accuracy and uncertainty limits of instrument transformers for PQ measurements", IT4PQ online stakeholder workshop, Feb. 2022
  - Fabio Muñoz, "Approach for an industrial wideband PQ comparator based on synchronized sampling units", IT4PQ online stakeholder workshop, Feb. 2022.
  - Fabio Muñoz, "Approach for an industrial wideband comparator for Its", joint IT4PQ and IEC TC38 WG47 meeting, Milano, November 2022.
- Metrologie voor DC-netten (DC grids)
  - Helko van den Brom, Zander Marais, and Ronald van Leeuwen, "Testing of DC Electricity Meters with Broadband Conducted Electromagnetic Disturbances", Digest International Conference on Harmonics and Quality of Power (ICHQP), Napels, mei 2022.
  - Helko van den Brom, Julio Melero, Vladimir Cuk, Guglielmo Frigo, Daniele Gallo, Daniela Istrate, Domenico Giordano, Michael Blaz, Brian Stewart, and Xavier Yang, "Traceable Power Quality Measurements in DC Electricity Grids", CPEM 2022, Wellington, New Zealand.
  - Helko van den Brom, "Testing of DC Electricity Meters with Broadband Conducted Electromagnetic Disturbances", ICHQP, Napels, mei 2022
  - Helko van den Brom, "Standardisation of measurements for DC electricity grid", DC grids mid-term stakeholder workshop, Malaga, Spain, 28 October 2022.
  - Helko van den Brom, "Traceable Power Quality Measurements in DC Electricity Grids", CPEM 2022, Wellington, New Zealand.
- HF-metrologie voor toekomstige communicatiebehoeften (FutureCom)
  - F. Mubarak, C.D. Martino, R. Toskovic, G. Rietveld, and M. Spirito, "VNA-based power sensor calibration", in Proc. Of conference on precision electromagnetic measurements (CPEM), 2022, New Zealand.
  - F. Mubarak, C.D. Martino, R. Toskovic, G. Rietveld, and M. Spirito, "RF attenuation measurement system", in Proc. Of conference on precision electromagnetic measurements (CPEM), 2022, New Zealand.
  - D. Allal et al., "RF Measurements for Future Communication Applications: an Overview," 2022 IEEE International Symposium on Measurements & Networking (M&N), 2022, pp. 1-6, doi: 10.1109/MN55117.2022.9887740.
  - Lezing: Fabio Munoz, "RF attenuation measurement system", in Proc. Of conference on precision electromagnetic measurements (CPEM), 2022, New Zealand.
  - Poster: "VNA-based power sensor calibration", in Proc. Of conference on precision electromagnetic measurements (CPEM), 2022, New Zealand.
- HF-metrologie voor supergeleidende quantumcircuits
  - E. Shokrolahzade, et.all, "Impedance Standard Substrate Characterization and EM model definition for Cryogenic and Quantum-Computing Applications", in Proc. Of International Microwave Symposium, 2023, USA (under review).

## LENGTE

- Metrologie voor extracellulaire deeltjes (MetVes II)
  - Martine Kuiper, Richard Koops, Rienk Nieuwland, Edwin van der Pol, Method to traceably determine the refractive index by measuring the angle of minimum deviation, <https://doi.org/10.1088/1681-7575/ac8991>.
- De grenzen van optische nanodimensionele metrologie verleggen (POLight)
  - Joint presentation with DFM in European Optical Society Annual Meeting 2022 (EOSAM 2022) P.E. Hansen, L. Siaudinyte "Virtual Microscopy. Ways to improve Microscopy".

- Herleidbare dimensionele metingen voor de industrie gebruikmakend van optische microscopie (TracOptic)
  - Joint presentation with DFM in European Optical Society Annual Meeting 2022 (EOSAM 2022) P.E. Hansen, L. Siaudinyte “Virtual Microscopy. Ways to improve Microscopy”.

#### THERMOMETRIE

- Metrologie voor watersporen in ultrapure gassen (PROMETH2O)
  - Presentatie: S. Persijn, *Metrology for renewable energy gases*, International Workshop on Laser Diagnostics and its Application for the Renewable Energy Sector, 7-8 maart 2022.

#### OPTICA

- Metrologie voor remote sensing van optische eigenschappen van aerosolen (MAPP)
  - Seymour A., Chernysheva K., Pó M. (in press.) Traceable radiometric characterization and uncertainty budget development of spectroradiometer designed for solar spectral data acquisition. Accepted for publication in AIP Proceedings of IRS 2022. The work was presented as a poster at the IRS 2022 conference and then a manuscript was peer-reviewed and accepted for publication.
- Metrologie voor ‘Temporal Light Modulation’ (MetTLM)
  - OP27 Facility for calibration of photometers for temporal light modulation, Dekker, P.R., van Bloois, A.L. DOI 10.25039/x48.2021.OP27, publicatie en presentatie op de OP27-conferentie. De publicatie is geselecteerd voor een speciale editie van *Lighting Research and Technology* en zal daarin onder peer-review gepubliceerd worden.
- Herleidbare optische constanten en nanolaagjes (ATMOC)
  - G.J.P. Kok, G. Wübbeler and C. Elster, Impact of imperfect artefacts and the modus operandi on uncertainty quantification using virtual instruments, geaccepteerd voor publicatie in *Metrology*, 2022.
  - G.J.P. Kok, G. Wübbeler and C. Elster, Uncertainty calculation using virtual experiments: a case study for a virtual scatterometer, ingediend voor MATHMET 2022 conferentie in Parijs, november 2022.

#### TIJD & FREQUENTIE

- Bedrijfszekerheid TF-disseminatie via glasvezel
  - P.Waller, C.Plantard, E.Dierikx, Y.Xie, "One Year of WR Link Operation Between Two UTC(k)", EFTF-IFCS 2022.
  - Cherif Diouf, Han Dun, Gerard Janssen, Erik Dierikx, Jeroen Koelemeij, Christian Tiberius, "Terrestrial Networked Positioning System with decimeter level accuracy through fiber-optic sub-nanosecond timing and wideband radio ranging", *GPS World*, May 2022.
  - Jeroen C. J. Koelemeij, Han Dun, Cherif E. V. Diouf, Erik F. Dierikx, Gerard J. M. Janssen, Christian C. J. M. Tiberius, "A hybrid optical–wireless network for decimetre-level terrestrial positioning", *Nature* 611, 473–478 (2022). <https://doi.org/10.1038/s41586-022-05315-7>.
- Nieuwe tijdssignalen voor (sub-)ps tijdsintervalmetingen (TiFOON)
  - Yan Xie, Erik Dierikx, Marijn van Veghel, "A new SDR-based TX-RX structure for accurate time and frequency transfer over optical fibers", presentatie op EFTF 2022.

#### VOLUMETRIE

- Debietmetingen voor hernieuwbare gassen en gasmengsels in het gasnet (NewGasMet)
  - Deelname aan CEN/TC237 meetings met bijdragen ter herziening standaarden met name in de WG5 Task Group “Non-conventional gases” in april, mei, juli 2021 en april 2022.
  - NEWGASMET stakeholder meeting, kennisverspreiding, o.a., duurzaamheidstestresultaten van huishoudelijke gasmeters), 9 maart 2022.
  - NEWGASMET presentaties in de EURAMET TC Flow, in november 2020, september 2021 en mei 2022.
  - NEWGASMET training session bijdrage door M. Workamp, European metrology network (EMN), 29 september 2022.

- *Flow metering of renewable gases (biogas, biomethane, hydrogen or syngas)*, 20<sup>th</sup> international metrology congress 2021, [Link](#).
  - Online paper (niet peer-reviewed) "Effect of hydrogen admixture on the accuracy of a rotary flow meter" (<https://www.vsl.nl/sites/default/files/rtf/Report%20accuracy%20test%20rotary%20meter.pdf>).
  - Dissemination van *Recommendations report - MID compliance for rotary displacement gas meters (EN 12480) when measuring renewable gases* aan de CEN/TC237 WG2 voorzitter, 11 januari 2022.
  - Dissemination van *Recommendations report - MID compliance for turbine gas meters (EN12261) when measuring renewable gases* aan de CEN/TC237 WG3 voorzitter, maart 2022.
  - NewGasMet report - *Report on the Effect of the renewable gases on the uncertainty budgets of gas meters* (newgasmet.eu website – [Link](#)).
  - NewGasMet report – *Report on gas tightness testing of domestic gas meters and compact conversion devices (EVCD) for hydrogen applications* (newgasmet.eu website – [Link](#)).
  - Deliverable D4 - *Report on recommendations for the traceable calibration (type testing) and verification procedures for rotary displacement, turbine, diaphragm, domestic ultrasonic, thermal mass flow gas flow meters which measure renewable gases, in compliance with the requirements of the 2014/32/EU Measuring Instruments Directive and recommendations reports on (I) test gases, flow rate, pressure range, and meter sizes, (II) the effects of renewable gases on the uncertainty budgets of gas meters* (newgasmet.eu website - [Link](#)).
  - Deliverable D5 - *Report on (I) the durability of the materials, electrical insulation and internal components of domestic gas meters after exposure to renewable gases, (II) the effects that renewable gas flow has on the durability of gas meters and how this effects their accuracy, and (III) recommendations for improving current calibration and verification facilities* (newgasmet.eu website – [Link](#)).
  - Deliverable D6 - *Report on the inter-comparison of 2 flow calibration standards with N<sub>2</sub>, H<sub>2</sub> and CH<sub>4</sub> including the test protocol, validated calibration methods and uncertainty budgets* (newgasmet website – [Link](#)).
  - Deliverable D7 - *Report on the type testing procedures for domestic and commercial gas meters with hydrogen and one other test gas (air, nitrogen, methane or natural gas)* (newgasmet.eu website – [Link](#)).
  - Online EMPIR-project news features (<https://newgasmet.eu/news>):
    - "Training session", 24 augustus 2022.
    - "Final Project Meeting", 25 oktober 2022.
- Metrologie voor hoge-druk gas en vloeibare waterstofflows (MetHyInfra)
- H.-B. Böckler et al., *Metrology infrastructure for high-pressure gas and liquified hydrogen flows*, Flomeko 2022, Chongqing China, november 2022.
  - M.D. Schakel et al., *Establish traceability for liquefied hydrogen flow measurements* (eerste abstract geaccepteerd), Flomeko 2022, Chongqing China, november 2022.
  - F. Gugole et al., *REPORT: Uncertainty in U-shape Coriolis mass flow meter for liquid hydrogen measurements* (methyinfra.ptb.de - [Link](#)).

- F. Gugole, *State-of-the-art in traceable cryogenic flow measurement - New insights on LH2 flow measurement uncertainty*, MethHyInfra training, februari 2022, <https://www.methyinfra.ptb.de/information-communication/downloads/>.
- M. Schakel *State-of-the-art in traceable cryogenic flow measurement - VSL's LNG calibration and test facility: for flow and quality*, MethHyInfra training, februari 2022, <https://www.methyinfra.ptb.de/information-communication/downloads/>.
- “REPORT: Uncertainty in U-shape Coriolis mass flow meter for liquid hydrogen measurements”, 1 november 2022.
- “Downloads are available”, 1 maart 2022.
- Metrologie voor waterstof (Met4H2)
  - Posterpresentatie op MathMet 2022 over WP4 (totalisatie).
- Nauwkeurige ultrasone waterstofflowmeter voor openbare waterstoflaadinfrastructuur (HERO)
  - HERO: Nauwkeurige ultrasone H2 flowmeter voor openbare H2-laadinfrastructuur, Innovatie- en netwerkmiddag over waterstof, RvO en TKI Nieuw Gas, april 2022.

#### TECHNOLOGIEOVERSCHRIJDEND

- EMN Mathmet (Mathmet)
  - Kok, Gertjan, "The digital transformation and novel calibration approaches" *tm - Technisches Messen*, vol. 89, no. 4, 2022, pp. 214-223. <https://doi.org/10.1515/teme-2021-0136>
  - G.J.P. Kok, “Use case examples for the MATHMET Quality Management System at VSL”, accepted for oral presentation at joint IMEKO-MATHMET workshop in Porto, 2022, and submitted for publication in Acta-Imeko journal.