

Hakone XVII



August 21st – 25th, 2022 Rolduc Abbey, Kerkrade, The Netherlands.

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1 Introduction

HAKONE XVII will be held in the south of the Netherlands in the former Abbey Rolduc, August 21st - 25th, 2022. The biennial HAKONE symposium series started in Hakone (Japan) in 1987 and is devoted to the fundamentals and applications of non-thermal plasmas and their chemistry at elevated pressures.

1.1 Scope & Format

HAKONE brings together scientists and engineers from academia and industry working on high pressure and low temperature plasma chemistry. The symposium aims to connect more traditional subjects such as ozone synthesis, basic oxidants generation, water treatment and environmental protection to the emerging and innovative fields of biomedical applications, micro-plasmas and alternative materials.

1.2 Venue



HAKONE XVII will be held at the Rolduc abbey in Kerkrade, which is one of the most important religious monuments in the Netherlands. The abbey's rich history dates back more than 900 years. Rolduc is the largest abbey complex in the Benelux and one of the Dutch UNESCO Top 100 monuments. Rolduc abbey can be reached by public transport from Amsterdam Schiphol airport ($\approx 3:30$ hrs), Düsseldorf airport ($\approx 2:00$ hrs) and Maastricht airport ($\approx 1:30$ hrs).

We will provide a shuttle bus between Herzogenrath railway station (Germany) and the conference venue, and possibly between Kerkrade railway station and the venue as well. We will likely start with this around 13:00 on Sunday. If you would like to use this then please let us know when and where you expect to arrive.

WIFI

WIFI is available on an open network without requiring a password.

1.3 Conference Topics

- T01 Fundamental problems of high pressure discharges
- T02 Modelling and diagnostics
- T03 Molecular synthesis and decomposition
- T04 Ozone generation and applications
- T05 Generation of radiation in high-pressure discharges
- T06 Depollution and environmental applications
- $\textbf{T07} \ \ \text{Surface processing and technology (cleaning, coating, etching and modification, equipment)}$
- ${f T08}$ Biological applications
- T09 Miscellaneous

1.4 Information for Presenters

Orals are 20 minutes (16 min + 4 min questions), while invited presentation and the Ulrich Kogelschatz Lecture Award are 50 minutes (45 min + 5 min questions). Please upload your presentation to the central laptop well in advance of your scheduled presentation block.

Posterboards will be 1.25 meter high and 1.00 meter wide. Posters can be mounted on the poster boards inside the lecture hall for the entire symposium. Furthermore, all poster presenters are requested to submit a one-page slide latest on Sunday, Aug. 21st for the one-minute poster presentation introduction. Please submit a PDF, preferably in 16:9 aspect ratio.

2 Committees

2.1 Local Organizing Committee

- Sander Nijdam (chair), Eindhoven University of Technology
- Behnaz Bagheri, Eindhoven University of Technology
- Ute Ebert, Centre for Mathematics and Computer Science (CWI) Amsterdam
- Tom Huiskamp, Eindhoven University of Technology
- Gerrit Kroesen, Eindhoven University of Technology
- Gerard van Rooij, Maastricht University
- Ana Sobota, Eindhoven University of Technology

2.2 International Scientific Committee

- Mirko Černák (chair), Czech Republic
- Ronny Brandenburg, Germany
- Nicolas Naude, France
- Tony Herbert, Ireland
- Tomáš Hoder, Czech Republic
- Indrek Jõgi, Estonia
- Kirill V. Kozlov, Russia
- Štefan Matejčík, Slovakia
- Jerzy Mizeraczyk, Poland
- Naoki Osawa, Japan
- Cristina Paradisi, Italy
- Yi-Kang Pu, China
- Henryka D. Stryczewska, Poland
- Fumiyoshi Tochikubo, Japan

3 Sponsors

Hakone XVII is sponsored by the Dutch Research Council (NWO) and Plasma Matters B.V.





4 Program

4.1 Program table

	Sun, Aug 21		Mon, Aug 22		Tue, Aug 23		Wed, Aug 24	Thu, Aug 25
		08:00	Breakfast	08:00	Breakfast	08:00	Breakfast	Breakfast
		09:00	Opening	09:00	102 - Koichi Sasaki	09:00	104 - Deborah O'Connel	105 - Xin Pei Lu
		09:10	Françoise Massines	09:50	C09 - Vlasta Štěpánová	09:50	C17 - Alex Destrieux	C29 - Yury Gorbanev
		10:00	C01 - Elizabeth Mercer	10:10	C10 - Julia Mrotzek	10:10	C18 - Anne Limburg	C30 - Ursel Fantz
		10:20	Coffee break	10:30	Coffee break	10:30	Coffee break	Coffee break
		10:50	C02 - Roman Přibyl	11:00	C11 - Kristian Wende	11:00	C19 - David Prokop	C31 - Mostafa Hassan
		11:10	C03 - Antoine Belinger	11:20	C12 - Mark Kushner	11:20	C20 - Siebe Dijcks	C32 - David Sawtell
		11:30	C04 - Fumiyoshi Tochiku	11:40	C13 - Jan Cech	11:40	Organ concert	C33 - Chiel Ton
		11:50	C05 - Corentin Bajon	12:00	C14 - Ravi Patel	12:00	Organiconcert	Closing ceremony
		12:30	Lunch	12:30	Lunch	12:30	Lunch	Lunch
		14:00	Poster 1-slide presenta	14:00	C15 - Perla Trad	14:00	103 - Luc Stafford	Bus to Eindhoven
		14:40	0 Poster session	14:20	C16 - Jeroen van Oorsch	14:50	C21 - Markus Becker	(optional)
						15:10	C22 - Mohammad Hasar	
						15:30	Coffee break	
						16:00	C23 - Hans Höft	
						16:20	C24 - Hani Francisco	
		16:40	I01 - Judith Golda			16:40	C25 - Thijs van der Gaag	(optional)
		17:00	C06 - Naoki Osawa	15:00	Excursion + banquet	17:00	C26 - Davide Del Cont-B	
		17:20	C07 - Thomas Orrière			17:20	C27 - Francisco Pontiga	
		17:40	C08 - Kazuki Watanabe			17:40	C28 - Lucia Kuthanová	
18:00	Formal registration	18:00	Free time			18:00	Free time	
		18:30	Dinner			18:30	Dinner	
19:00	Welcome reception					19:30	ISC-meeting	

Ulrich Kogelschatz Award Lecture

Invited lecture

Contributed lecture

4.2 Detailed program including social program

Sun, Aug 21

18:00 - 20:00 Formal registration

Chance to register for the conference. Hotel rooms will be available starting from 15:00

$\mathbf{19:}\mathbf{00}$ - $\mathbf{22:}\mathbf{00}$ Welcome reception

A welcome reception is organized in the hotel bar ('De Verloren Zoon', 'The Lost Son') located in the cellar.

Mon, Aug 22

08:00 - 09:00 Breakfast

In the large dining room ('Grote Eetzaal')

09:00 - 09:10 Opening

In the Aula Minor (building opposite to the reception).

Session chair: Mirko Černák

09:10 - 10:00 Ulrich Kogelschatz Lecture Award UKL: Françoise Massines T01

CNRS, France.

Physics of diffuse DBDs and on line thin film treatment: History, recent developments and new challenges

10:00 - 10:20 Contributed C01: Elizabeth Mercer T01

University of Antwerp, Belgium.

Effects of Post-Plasma Mixing in a CO₂ Microwave Plasma on Conversion and Energy Efficiency

10:20 - 10:50 Coffee break

Foyer + terrace

Session chair: Ronny Brandenburg

10:50 - 11:10 Contributed C02: Roman Přibyl T01

Masaryk University, Czech Republic.

Alumina ceramic tapes doped by various dopants and their effect on properties of coplanar dielectric barrier discharge

11:10 - 11:30 Contributed C03: Antoine Belinger T01

LAPLACE, Université de Toulouse, France.

Influence of the dielectric on a Diffuse Dielectric Barrier Discharge in air at atmospheric pressure

11:30 - 11:50 Contributed C04: Fumiyoshi Tochikubo T01

Tokyo Metropolitan University, Japan.

Characteristics of Trichel Pulse Discharge from Taylor Cone with AC Superimposed DC Voltage

11:50 - 12:10 Contributed C05: Corentin Bajon T01

Laboratoire Plasmas et conversion d'énergie, France.

Dielectric Barrier Discharge in CO₂: electrical and optical characterization

12:30 - 14:00 Lunch

Foyer + terrace

14:00 - 14:40 Poster 1-slide presentations

A quick introduction to all posters. All poster presenters are requested to submit a one-page slide latest on Sunday, Aug. 21st.

14:40 - 16:40 Poster session

Including some refreshments.

P01: **Indrek Jõgi** T08

University of Tartu, Estonia.

Virus and aerosol removal by electrostatic precipitator

P02: Kubra Ulucan-Altuntas T06

University of Padua, Italy.

Degradation of Perfluorooctanoic Acid (PFOA) in Water by Non-Thermal Plasma Enhanced by Boron-Doped Reduced Graphene Oxide

P03: Sean Kelly T06

University of Antwerp, Belgium.

Microwave plasma-based conversion of methane and carbon dioxide

P04: Francisco Pontiga T06

Universidad de Sevilla, Spain.

Carbon dioxide conversion using ac and pulsed dielectric barrier discharge

P05: Tian Tian T06

GREMI, UMR7344, CNRS/Université d'Orléans, France.

Removal of amoxicillin and sulfamethoxazole in water using non-thermal plasma

P06: **Hamed Mahdikia** T06

Leibniz Institute for Plasma Science and Technology, Germany.

Operating Barrier Corona Discharges in Argon and CO₂ Gas Mixtures at Elevated Pressure

P07: Rezvan Hosseini Rad T06

Leibniz Institute for Plasma Science and Technology (INP), Germany.

Electrical Characterization of a Coaxial Dielectric Barrier Discharges for CO_2 splitting at Elevated Pressure

P08: Shahriar Mirpour T01

Eindhoven university of technology, Netherlands.

Investigating CO₂ streamer inception in repetitive pulsed discharges

P09: Lucia Švandová T01

Masaryk University, Czech Republic.

Properties of Cr-doped Al_2O_3 as a dielectric barrier layer

P10: Mária Cíbiková T01

University of Comenius, Faculty of Mathematics, Physics and Informatics, Bratislava, Slovakia, Slovakia.

Characterization of emission current generated by pulse electric field in microdischarge electrode system

P11: Lucia Kuthanová T01

Masaryk University, Czech Republic.

Spatiotemporal memory effects in barrier discharge at water interface

P12: Simon Dap T01

LAPLACE - Toulouse University, France.

Pre-ionization in atmospheric pressure townsend discharges (APTD): surface vs volume mechanisms

P13: **Hiroshi Arai** T01

Chiba Institute of Technology, Japan.

Linearized Penning effect in gas mixture with small amount of H₂O content in He

P14: **Haruo Itoh** T01

Chiba Institute of Technology, Japan.

Increase of Penning ionization coefficient proportional to small amount of water vapor admixed with helium

P15: **Shuai Zhao** T09

Eindhoven University of Technology, Netherlands.

Microelectrode-assisted atmospheric pressure air discharge and its extended applications

P16: Nicolas Naudé T09

Université de Toulouse, France.

 $\label{lem:discharges:from spatially resolved electrical measurements\ to\ a\ reconfigurable\ electrode$

P17: Zdenek Navratil T02

Masaryk University, Czech Republic.

 ${\it 2D-resolved\ electric\ field\ measurement\ in\ helium\ coplanar\ DBD\ using\ multi-wavelength\ single\ photon\ counting}$

P18: Emanuel Maťaš T02

Faculty of Mathematics, Physics and Informatics, Comenius University, Slovakia.

Ion Mobility Spectrometry diagnostics of NOx generated in kHz driven DBD plasma jet in Argon

P19: Sara Ceulemans T02

University of Antwerp, Belgium.

Effect of quenching on the afterglow temperature to improve CO_2 conversion in a rotating gliding arc plasma reactor

P20: **Dennis Bouwman** T02

Centrum Wiskunde & Informatica (CWI), Netherlands.

Theoretical approximations for macroscopic parameters of positive streamer discharges

P21: Tomas Hoder T02

Masaryk University, Czech Republic.

Kinetics of the $N_2(A^3\Sigma_u^+, v)$ state in atmospheric pressure townsend discharge in N_2

P22: Tomas Hoder T02

Masaryk University, Czech Republic.

Development of a method for determination of the electric field in transient argon discharges

P23: Omar Biondo T02

University of Antwerp, Belgium.

Gas heating dynamics in a CO₂ pulsed glow discharge resolved by kinetic modeling

P24: Yihao Guo T02

Eindhoven University of Technology, Netherlands.

3D reconstruction and analysis of branching streamer discharges in air

P25: David Rauner T02

Leibniz Institute for Plasma Science and Technology (INP), Germany.

 $Spectroscopic\ determination\ of\ rotational\ and\ vibrational\ temperatures\ in\ molecular\ MW\ plasmas\ for\ gas\ conversion$

P26: Julia Mrotzek T02

HAWK, Germany.

Characterization of the plasma torch of an APPJ for thin film deposition

P27: Gerard van Rooij T03

Maastricht University, Netherlands.

Unravelling Transport in CO₂ Microwave Plasma by Comparing Flow Geometries

P28: Hemaditya Malla T04

Centrum Wiskunde & Informatica, Netherlands.

Identifying the Major Reactive Oxygen-Nitrogen Species in a Pulsed Streamer Discharge

P29: Slavomír Sihelník T07

Masaryk University, Czech Republic.

Dry cleaning and activation of flexible glass using nonthermal plasma before PEDOT:PSS coating

P30: Katerina Polaskova T07

Brno University of Technology, Czech Republic.

Effect of Plasma and Light Irradiation on Morphology of Deposited TiO₂ Nanoparticles

P31: Richard Krumpolec T07

Masaryk University, Czech Republic.

 $\label{like-problem} \textit{Ultra-fast low temperature atmospheric plasma triggered reduction-exfoliation of highly porous aerogel-like graphene oxide$

P32: Maria Luíza de Azevedo T07

Maastricht University, Netherlands.

Fast pyrolysis in methane plasma

P33: Wouter Graef T02

Plasma Matters, Netherlands.

Status report on the LXCat project

P34: Daan Boer T02

Eindhoven University of Technology, Netherlands.

A Novel Data Platform for Low-Temperature Plasma Physics

P35: Jakub Kelar T07

Masaryk University, Czech Republic.

High quality UV digital printing on various materials with plasma enhanced surface

Session chair: Nicolas Naudé

16:40 - 17:00 Invited I01: Judith Golda T06

Ruhr-University Bochum, Germany.

Cold Atmospheric Pressure Plasmas for Plasma Catalytic Applications: Characteristics, Constraints and Challenges

17:00 - 17:20 Contributed C06: Naoki Osawa T01

Kanazawa Institute of Technology, Japan.

Comparison of surface charge density distribution generated by diffuse and filamentary barrier discharges in atmospheric pressure air

17:20 - 17:40 Contributed C07: Thomas Orrière T01

Université de Poitiers, France.

3D Topography of a liquid surface interacting with an Argon plasma jet

17:40 - 18:00 Contributed C08: Kazuki Watanabe T01

Kanazawa Institute of Technology, Japan.

Effect of surface resistivity on surface charge density and diffuse dielectric barrier discharge in atmospheric pressure air

18:00 - 18:30 Free time

18:30 - 20:00 Dinner

Zaal 2, afterwards, the hotel bar is open.

Tue, Aug 23

08:00 - 09:00 Breakfast

In the large dining room ('Grote Eetzaal')

Session chair: Indrek Jõgi

09:00 - 09:50 Invited I02: Koichi Sasaki T02

Hokkaido University, Japan.

Detection of negative ions in dc glow and streamer discharges produced in ambient air

09:50 - 10:10 Contributed C09: Vlasta Štěpánová T07

Masaryk University, Czech Republic.

Adhesion improvement of LLDPE/PA tubular foil used as sausage casing after a very short atmospheric-pressure roll-to-roll plasma treatment

10:10 - 10:30 Contributed C10: Julia Mrotzek T07

HAWK, Germany.

OES as tool for characterization of an APPJ for thin film deposition

10:30 - 11:00 Coffee break

Foyer + terrace

Session chair: Naoki Osawa

11:00 - 11:20 Contributed C11: Kristian Wende T08

Leibniz Institute for Plasma Science and Technology, Germany.

Biomolecule oxidation by gas phase species – the role of the gas-liquid interphase

11:20 - 11:40 Contributed C12: Mark Kushner T08

University of Michigan, United States of America.

Atmospheric pressure plasma treatment of organics in liquid: extending reaction mechanisms into solution

11:40 - 12:00 Contributed C13: Jan Cech T06

Masaryk University, Faculty of Science, Czech Republic.

CaviPlasma - The new tool for energy-efficient large-scale treatment of liquids

12:00 - 12:20 Contributed C14: Ravi Patel T06

Eindhoven University of Technology, Netherlands.

Filamentary DBD plasma for ignition stabilized combustion

12:30 - 14:00 Lunch

Foyer + terrace

Session chair: Behnaz Bagheri

14:00 - 14:20 Contributed C15: Perla Trad T06

Laboratoire de Physique des Gaz et des Plasmas, France.

Influence of the applied HV-pulse rise time on the removal efficiency of n-hexane in a DBD

14:20 - 14:40 Contributed C16: Jeroen van Oorschot T06

Eindhoven University of Technology, Netherlands.

Real-Time In-Situ Characterization of Plasma Activated Water

14:40 - 21:40 Excursion + banquet

The excursion will be to the Zonneberg caves near Maastricht, followed by a boat-tour with dinner on the Maas (Meuse) river.

Wed, Aug 24

08:00 - 09:00 Breakfast

In the large dining room ('Grote Eetzaal')

Session chair: Fumiyoshi Tochikubo

09:00 - 09:50 Invited I04: Deborah O'Connell T01

Dublin City University, Ireland.

Controlling vibrational kinetics through energy input into repetitively pulsed atmospheric pressure nitrogen discharges

09:50 - 10:10 Contributed C17: Alex Destrieux T02

Laval University, Canada.

Toward a better understanding of the electrical properties in a dielectric barrier discharge during long-time operation

10:10 - 10:30 Contributed C18: Anne Limburg T02

Eindhoven University of Technology, Netherlands.

Influence of probing laser beam and electric field properties in E-FISH measurements

10:30 - 11:00 Coffee break

Foyer + terrace

Session chair: Ute Ebert

11:00 - 11:20 Contributed C19: David Prokop T02

Masaryk University, Czech Republic.

Spatiotemporal spectroscopic characterization of nanosecond pulsed volume barrier discharge in argon

11:20 - 11:40 Contributed C20: Siebe Dijcks T02

Eindhoven University of Technology, Netherlands.

Corona Imaging

11:40 - 12:20 Organ concert

An organ concert by the TU/e organ player in the church of the Rolduc Abbey.

12:30 - 14:00 Lunch

Foyer + terrace

Session chair: Tom Huiskamp

14:00 - 14:50 Invited I03: Luc Stafford T07

Université de Montreal, Canada.

Advanced surface engineering of cellulose nanomaterials using dielectric barrier discharges at atmospheric pressure

14:50 - 15:10 Contributed C21: Markus Becker T02

Leibniz Institute for Plasma Science and Technology (INP), Germany.

Combining modelling and experiment for advanced plasma diagnostics

15:10 - 15:30 Contributed C22: Mohammad Hasani T02

Eindhoven University of Technology, Netherlands.

Charge detection of plasma exposed surfaces using quantum dots photoluminescence

15:30 - 16:00 Coffee break

Foyer + terrace

Session chair: Gerrit Kroesen

16:00 - 16:20 Contributed C23: Hans Höft T02

INP Greifswald, Germany.

Impact of dielectric-covered electrode proximity on streamer propagation in pulsed-driven dielectric barrier discharges

16:20 - 16:40 Contributed C24: **Hani Francisco** T02

Centrum Wiskunde & Informatica, Netherlands.

The propagation and chemistry of positive streamers in lightning and sprite discharges at different air densities

16:40 - 17:00 Contributed C25: Thijs van der Gaag T02

Tokyo Institute of Technology, Japan.

EEDF measurement of cold atmospheric-pressure plasma by OES

17:00 - 17:20 Contributed C26: Davide Del Cont-Bernard T02

Maastricht University, Netherlands.

Development of the EFISH technique for electric field measurements in nanosecond repetitively pulsed discharges

17:20 - 17:40 Contributed C27: Francisco Pontiga T02

Universidad de Sevilla, Spain.

Distribution of neutral species in a corona discharge: effect of the electrohydrodynamic gas motion

17:40 - 18:00 Contributed C28: Lucia Kuthanová T09

Masaryk University, Czech Republic.

Liquid displacement by atmospheric pressure plasma in microgap

18:00 - 18:30 Free time

18:30 - 20:00 Dinner

Zaal 2, afterwards, the hotel bar is open.

19:30 - 22:00 ISC-meeting

Thu, Aug 25

08:00 - 09:00 Breakfast

In the large dining room ('Grote Eetzaal')

Session chair: TBD

09:00 - 09:50 Invited I05: Xin Pei Lu T01

HuaZhong University of Science and Technology, China.

Atmospheric Pressure Plasma

09:50 - 10:10 Contributed C29: Yury Gorbanev T03

University of Antwerp, Belgium.

Pulsed plasma jet for nitrogen fixation: Fundamentals and prospective technologies

10:10 - 10:30 Contributed C30: Ursel Fantz T03

Max-Planck-Institut fuer Plasmaphysik, Germany.

Enhancement of CO_2 conversion at atmospheric pressure by influencing the gas quenching in the effluent of a microwave plasma torch

10:30 - 11:00 Coffee break

Foyer + terrace

Session chair: Tomáš Hoder

11:00 - 11:20 Contributed C31: Mostafa Hassan T03

Faculty of Mathematics, Physics and Informatics, Comenius University, Slovakia. The role of gas-water interface size on solvation of gaseous species to water

11:20 - 11:40 Contributed C32: David Sawtell T03

Manchester Metropolitan University, United Kingdom.

Insights into nitrogen fixation using microfluidic plasma devices

11:40 - 12:00 Contributed C33: Chiel Ton T04

Eindhoven University of Technology, Netherlands.

Transient plasma for air purification using 400 kV pulses

12:00 - 12:20 Closing ceremony

12:30 - 14:00 Lunch

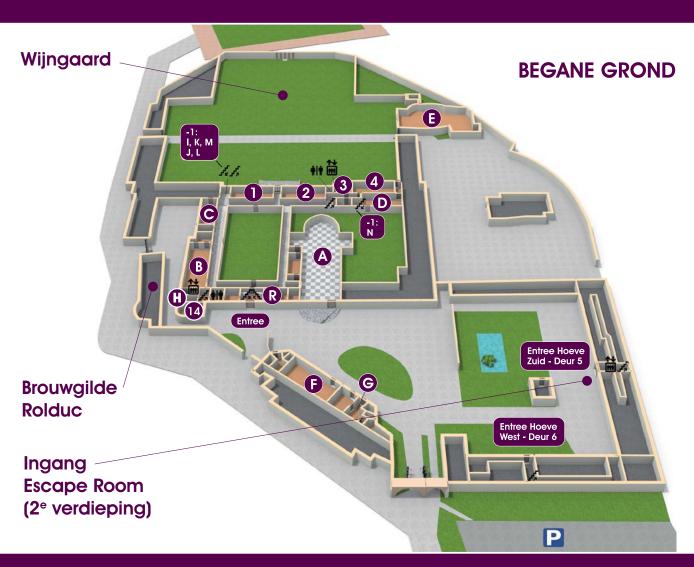
Foyer + terrace

14:00 - 15:30 Bus to Eindhoven (optional)

If you would like to join the lab tour and have not registered yet, then please do this as soon as possible.

15:30 - 17:30 Labtour Eindhoven (optional)





BEGANE GROND

- A Abdijkerk
- **B** Grote Eetzaal
- C Brasserie De Kanunnik
- D Foyer
- E Aula Major (buiten)
- Aula Minor (buiten)
- G Fietsenstalling (buiten)
- H Bagageruimte
- Receptie R

BEGANE GROND

- Zaal 1
- 2 Zaal 2
- Zaal 3
- Zaal 4
- 14 Zaal 14

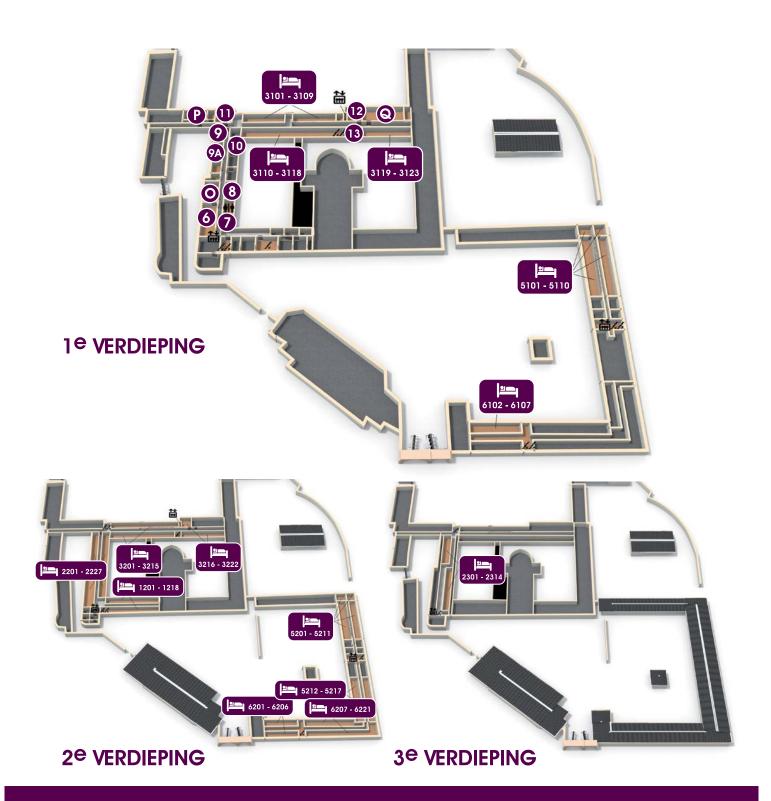
KELDER (-1)

- De Verloren Zoon
- Zwaantie
- Rookruimte
- Kana 1
- M Kana 2
- **Boerenkelder**

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1e VERDIEPING 1e VERDIEPING Kleine Eetzaal Zaal 6 6 **Bisschopszaal** 7 Zaal 7 **Q** Rococo-bibliotheek 8 Zaal 8 9 Zaal 9 9A Zaal 9A 10 Zaal 10 Zaal 11 12 Zaal 12

13 Zaal 13

3^e VERDIEPING

1e VERDIEPING

2^e VERDIEPING

5101 - 5110 (Hoeve)

6102 - 6107 (Hoeve)

5201 - 5217 (Hoeve)

6201 - 6221 (Hoeve)

2301 - 2314 (hoofdgebouw)

3101 - 3123 (hoofdgebouw)

1201 - 1218 (hoofdgebouw)

2201 - 2227 (hoofdgebouw) 3201 - 3222 (hoofdgebouw)