GeoNeurale

Announces

ADVANCED “NUCLEAR MAGNETIC RESONANCE” PETROPHYSICS

31 October - 4 November 2016

Munich

Instructor: Pedro Romero
GeoNeurale

ADVANCED “NUCLEAR MAGNETIC RESONANCE” PETROPHYSICS

MUNICH

at the

GATE – Munich Technical University Research Center

31 October - 4 November 2016

5 DAYS COURSE
INSTRUCTOR: Pedro Romero
LEVEL: Advanced / Specialized
AUDIENCE: Petrophysicists, Geophysicist, Reservoir Engineers, Geologists.
COURSE FEES: 3850 Euro plus 19% VAT (Private companies outside Germany are also allowed to avoid VAT TAX)
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GeoNeurale

Training Location
ADVANCED COURSE PREPARATION

Due to the advanced character of this course an online preparation program will start at least two weeks before the course to assist those delegates who would like to review the background theory necessary to face the course with solid concepts of NMR Petrophysics, and related issues.
Advanced NMR Petrophysics

**Instructor:** Dr.-Eng. Pedro A. Romero Rojas  
Senior Research Scientist at GeoNeurale

**Course outline**

1. Day

Review of petrophysical theory and tools. Correlation methods in the microsystem domain of petrophysical properties and in the waveform analysis (correlation, frequency analysis, wavelets (re-)semblance analysis. Integration with other disciplines.

2. Day

3. Day

NMR Physics: Spin system, energy levels, resonance phenomenon, T1 and T2 relaxations.
NMR Signal: Echo trains, multiexponential decay, noise, ringing, inversion.
NMR tools: laboratory and logging tools (WL and LWD).
NMR of bulk fluids: water, Tar, heavy oil, light oil, gas.
NMR of fluids in porous media: water as wetting or non-wetting phase, magnetic field gradient effect on hydrocarbons.

4. Day

NMR Petrophysics models: Porosity model, permeability models, invaded zone saturations, 1D- and 2D-NMR.
NMR Petrophysical evaluations: Sandstone, Carbonate, Shales.

5. Day

Case Studies from the literature: Heavy oil, carbonates, core-log Integration.
New NMR evaluation techniques based on Machine learning Tools
Dr. Pedro Romero Rojas

is a geoscientist-engineer professional who delivers innovative, data-driven methods to solve complex petrophysical challenges. His main expertise lies in modern science and technology associated with integrated NMR-petrophysics and knowledge discovery data (KDD) for improving operational efficiency.

As highly motivated team leader, he honors commitments. Devoted to timely execution of projects with integrity and quality, he have also been known as effective communicator, multilingual lecturer and supporter of knowledge transfer.

► INTEGRATED NMR-PETROPHYSICS: Developed NMR permeability and rock quality indicators based machine learning, core and log data from wells drilled with oil-based mud, maximizing efficiency saving rig time on each avoided pressure sampled point.

► INNOVATION & KNOWLEDGE DISCOVERY DATA: 7 patents granted and 33 publications in oil and gas conferences and journals. Pioneered machine learning applications in NMR-petrophysics. Results improved operational geoscience applications and strengthened relationships with clients.

► PROJECT LEADERSHIP: Established and led active NMR-petrophysics laboratory group for R&D&S within Latin American oil companies, generating knowledge useful in understanding, applying, contracting well services NMR-technology. Improved institute’s position attracting project money from corporation (1.5 MM US$).

► LECTURER: Taught Physics, Petrophysics and Dielectric courses at universities in Brazil, Germany, Venezuela. Advisor of 39 M.Sc. and B.Sc. theses.

A list of core competencies includes:

• Petrophysics NMR-SME
• Well logs physics
• Electrical engineering
• Machine learning
• Project leadership
• Training instructor / Lecturer
Dr. Pedro Romero Rojas

Biography

Pedro Romero is a researcher who has dedicated significant part of his career to the development of the NMR technologies for petrophysical applications. He obtained his MSc in Experimental Physics in 1985 and his Ph.D degree in Electrical Engineering, both at the University of Siegen, Germany. He presently works as a NMR Subject Matter Expert and Global Geoscience Advisor as independent consultant. His career development is described below:

**AREAS OF EXPERTISE**

**Petrophysics:**
- Statistics and Machine Learning applied to log analysis and data integration.
- Developments of procedures for determine fluid typing and rock quality based on NMR, conventional logs and data from SCAL and RCAL.

**Project Management:**
- R&D project coordinator at Halliburton Brazil Technology Center.
- Presalt Carbonate characterization based on multivariate log analysis (2010-2012 at Rio Research and Technology Center of Baker Hughes Incorporate).
- Petrophysics for mature reservoirs (2003-04, University of Bahia, Brazil, sponsored by Brazilian Counsel for Research, CNPq).

**Material Sciences:**
- Dielectric Spectroscopy.
- Assessment of electrical conductivity of high voltage insulating materials.

**Nuclear Physics:**
- Analysis of heavy ions fragmentation processes in plastic detectors using digital image processing techniques.

**Optics, Electronics and Automation:**
- Analog and Digital hardware development.
- Optical Fourier Interferometry.

**Scientific Advisor:**
- Several theses (BSc. and MSc.).
Selected Publications

- **NMR Fluid Typing using Independent Component Analysis applied to Laboratory Data from Water-Oil Displacement Experiment**, Pedro A. Romero Rojas (Geounireale), Manuel Rincón Santander (PDVSA). The 30th International Symposium of the Society of Core Analysts, August 21 – 26, 2016, Snowmass, Colorado, USA.


- **Determination of Grain Size Distribution in a Turbiditic Heavy Oil Field from Brazil Offshore Based on LWD Data -NMR and Electrical Images**, Pedro A. Romero Rojas (Halliburton), Katharine Sandler-Klein and Marianne Iversen (Statoil), World Heavy Oil Congress, September 10 – 13, 2012, Aberdeen, Scotland, UK.


- **Method for Characterization of Rock Quality Based on Winland-Pittman and Timur-Cotes Equations Applied to NMR Laboratory Data**, Pedro A. Romero (at University of Bahia, Brazil), Nathali Gómez, 45th SPWLA Annual Logging Symposium, June 6 – 9, 2004, Noordwijk, The Netherlands.

- **Determination of Rock Quality in Sandstone Core Plug Samples Using NMR**, Pedro Romero (at PDVSA-Intevep), Gabriela Bruzual, Ovidio Suárez, 2002 International Symposium of the Society of Core Analysts, paper SCA2002-51, September 22 – 25, Monterey, CA, USA.
Affiliations

• IEEE (Vice-Chairman for IEEE section at OTC-2013 in Rio de Janeiro)
• SPWLA (Vice-President of Brazil-chapter 2011)
• SPE
• SCA (Society of Core Analysts)

Awards

• Baker Hughes’ Subject Matter Expert for NMR logging technology, January 2012.
• Lifetime Featured Member of America’s Registry of Outstanding Professionals, 2011.

Patents and Patent Filings

• T1 Distribution-Based Logging System and Methods Using Blind Source Separation Independent Component Analysis, PCT / US / 2015 / 056171, filed on 19.10.2015.
International Lectures

Nuclear Magnetic Resonance in Petrophysics:

NMR applied to Carbonates:
Basics of NMR Logging Technologies, Short course sponsored by Baker Hughes and SPWLA for Petrobras Rio de Janeiro, Petroleum Institute of State University of North of Fluminense (UENF-LENEP) and Observatorio Nacional (National Observatory), Rio de Janeiro, Brazil, March-April, 2010.
Resonância Magnética Nuclear aplicada na avaliação da formação (NMR applied in Formation Evaluation), Short course – SPWLA Brazil-Chapter: Dr. Pedro A. Romero – Baker Hughes.

Characterization of Heavy Oil using NMR, SPWLA Chapter Rio de Janeiro and Macaé Chapters, Brazil, April, 2010.
Application of low field NMR in petrophysics and fluid characterization, Federal University of Rio de Janeiro April 16th, 2009.
2D-NMR applications for fluid identification and permeability correction in heavy oil zones, The Brazil Chapter of SPWLA, Rio de Janeiro, Brazil, August 19th, 2008.

Dielectrics in High Voltage Insulating Materials (PhD. topics):

Diagnostic methods of water trees in high voltage cable insulation
University of Seville, Informatics Engineering and Applied Physics Department, Seville, Spain, 1995.
Simón Bolívar University, Electrical Engineering Faculty, Caracas, Venezuela, 1995.
Analysis of polarization processes in water trees in time and frequency domain
(Original German title: Untersuchung von Polarisationprozessen in Water Trees im Zeit- und Frequenzbereich).

Fluency
Multilingual lecturer in English, German, Portuguese and Spanish.
**Record of Employment**

**Present:** Germany, USA  Senior Research Scientist at GeoNeurale.

**Brazil:**
2012-2016: Project coordinator and Technical Advisor-Engineering/Petrophysics Applications, Chief at Halliburton Brazil Technology Center.
2010-12 (May): Geoscience Advisor for the Rio Technology Center of Baker Hughes Incorporated (BHI-RTC).
2008-10 : Geoscience Advisor of Brazilian and Latin America for BHI’s Geomarkets and business support for National and International Oil Companies.

**Argentina:**
2006-08

Technical Training and Marketing support for NMR and Formation-Lithology technologies. Geoscience-business support for (YPF-Repsol, Occidental).

**USA:**
2005-06
NMR-Scientist in Houston Technology Center (Baker Atlas-INTEQ):
Development of statistical methodologies for NMR and conventional log interpretations.

2004-05
Geoscience Advisor, Global Geoscience Group, Baker Hughes, division Baker Atlas (Houston): NMR logging applications.

**Brazil:**
2003-2004
Research Fellowship at the Federal University of Bahía, Salvador, Brazil: Coordination of R&D research activities in petrophysics of the project: *Petrophysical Characterization of Reservoirs and Alterations Generated in Faulted Zones.*
Sponsor: The National Council of Scientific and Technological Development of Brazil (CNPq).
Main research topics: NMR, Induction Polarization (IP), characterization of core and fluid samples, well log analysis.

Lecturer for undergraduate course on: *Physical Properties of Rocks* and postgraduate course in *Applications of Low Field NMR in Petrophysics.*

**Venezuela:**
1996-2003
Petrophysicist for R&D at Intevep, S.A. (PDVSA), Venezuela:
Project manager for *New Technologies in Petrophysics:* R&D and field studies support for El Furrial, Santa Bárbara, Carito, Barinas (carbonates), Lagomar, Centralago and Melones (heavy oil) fields.
Development and application of NMR laboratory methods for fluid characterization. NMR based rock quality characterization (lithofacies, petrofacies).
Development of experimental methods and applications of electrical measuring techniques for estimation of the frequency dependence of water and oil saturations in core plug samples.
Generation of pseudo-well-logs based on 3D seismic attributes, key well logs and core data using artificial intelligence (neural nets).

Conventional log evaluation.

Industrial tutorial of 22 undergraduate/Msc. thesis in cooperation with universities.

Fifteen (15) international publications in SPE, SCA, AAPG, SBGf, SVG conferences.

Venezuela-Germany (transition period Academia-Oil Industry):
1994-1995
Private Lecturer and Research Advisor.

Germany:
1987-1993
Scientific Assistant Professor at the Department of Materials used in Electrical Engineering, University of Siegen, Germany:
Lecturer for *Materials used in Electrical Engineering, Insulating Materials and High Voltage Techniques*”.
Development of electronic methods for assessing the electrical insulating behaviour of polyethylene insulated high voltage cables.
Tutorial of fifteen (15) undergraduate/MSc. thesis.
Twelve (12) technical papers in international conferences.

1986
Scientific Assistant of Professor at the Department of Experimental Physics at the University of Siegen:
Study of heavy ions interactions in plastic nuclear detectors using digital image processing techniques.
Registration Details

• Course fees: 3850 Euro + 19% VAT (Private companies outside Germany are also allowed to avoid VAT TAX)

• Registration deadline: 26 September 2016

Payment and Registration

Tuition fees are due and payable in Euro upon enrollment in the course by bank transfer to the bank account given below unless another payment form is agreed.

Unless otherwise agreed, the payment should be received before the date specified in the invoice as payment term to make the enrollment effective.

To register to the course please fill in the registration form and fax or email it along with the confirmation of your bank transfer to:

GeoNeurale
Am Nymphenbad 8
81245 Munich
T +49 89 8969 1118
F +49 89 8969 1117

ONLINE REGISTRATION: www.GeoNeurale.com

Bank Information: Genossenschaftsbank EG Muenchen

Bank Account N. 519618
BLZ 701 694 64

BIC – Code: GENODEF 1M07
IBAN: DE19 7016 9464 0000 5196 18

Please indicate your name and the purpose: “Advanced NMR Petrophysics.”
Provisions

Tuition fees are due and payable in Euro upon enrollment in the course. Unless otherwise indicated, fees do not include student travel costs and living expenses.

Payments are also accepted via personal or company check, traveler's check, credit card, and Company Purchase Orders.

Cancellations by Participant:

All cancellation are subject to a 100 Euro non-refundable cancellation fee.

Cancellation have to be notified to our office, at least 30 days prior to the course start date to receive a refund (less the 100 Euro cancellation fee).

If the participants are unable to cancel prior to the 32 days notification date, they may substitute another person at their place in a course by notifying us prior to the course start date.

Course Cancellations:

GeoNeurale reserves the right to cancel the courses if necessary. The decision to cancel a course is made at least two weeks prior to the course start date. If a course is cancelled, the participant will receive a full reimbursement of the tuition fees (but not of the plane ticket or hotel expenses or any other costs), or will be enrolled in another course upon his decision (the cost of the original course will be applied to the cost of the replacement course).

GeoNeurale can not be responsible for any penalties incurred for cancellation or change of airline or hotel reservations.

Refunds:

GeoNeurale will promptly remit all refunds of tuition fees due to cancellations or annulment (less any appropriate non-refundable cancellation fee) within 30 days of the course cancellation.

Force Majeure:

GeoNeurale can not be responsible for cancellations due to “force majeure” events: airplane or airport strikes, emergency situations, natural catastrophes and all situations and incidents independent or outside the human control that can delay or cancel the course. In case of such events related cancellations the course tuition fees will be refunded to the client.

Geoneurale is not responsible for any delay or absence caused by the training instructor or training instructor company for reasons which are independent or out of the control of GeoNeurale’s decisions.

AGREEMENT: Upon enrollment all parts accept the above mentioned provisions. The above specified provisions shall regulate the agreement between GeoNeurale and the participant and the participant company and will enter into force upon enrollment.
REGISTRATION FORM

Please fill out this form and Fax to +49 89 8969 1117
or Email to Courses@GeoNeurale.com

ADVANCED NMR PETROPHYSICS
Munich, 31 October - 4 November 2016

Course Fee: 3850 Euro plus 19% VAT (Private companies outside Germany are also allowed to avoid VAT)

Name:

Company:

Address:

Job Title:

Phone:

Fax:

Email:

SIGNATURE: ________________________________

www.GeoNeurale.com
After the courses: GeoNeurale organizes geological field trips on the Alps. Informations and registrations: courses@geoneurale.com
A Petrophysics school in the alpine region