CURRÍCULUM VÍTAE NORMALIZADO

José Hugo Garcia Aguilar

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Summary of CV

This section describes briefly a summary of your career in science, academic and research; the main scientific and technological achievements and goals in your line of research in the medium -and long- term. It also includes other important aspects or peculiarities.

Jose Garcia is an expert in quantum transport, focused mainly on numerical studies of low-dimensional disordered materials. During the past four years, he has pioneered an efficient numerical method for computing the conductivity tensor and other nonequilibrium properties of systems containing more than hundreds of millions of atoms. This algorithm was also one of the first in taking into account the topological contribution for electric and spin transport, which is required for the correct description of technologically relevant phenomena such as the spin Hall Effect, the Inverse Spin Galvanic Effect, and the Spin-orbit Torque. More recently, he has also increase the scope of his algorithm by including k-dependent selectivity, a feature which allows for the study of geometrical and valley dependent effects such as the Valley Hall Effect.

This method has been used extensively for determining the electrical and spintronics capabilities of different graphene-based two-dimensional devices. Recently, he predicted a comparable large Charge-To-Spin conversion in graphene/transition metal dichalcogenide (TMD) heterostructures, which was later experimentally confirmed in a study published in NanoLetters, where he is also a co-author. Additionally, he developed a theoretical framework based on different numerical results which were used to predict two different experimental signatures for probing and characterizing the presence of spin-orbit coupling in graphene/ TMDC heterostructures: (i) a giant spin lifetime anisotropy in Hanle experiments, and (ii) a large symmetric/antisymmetric spin rates ratio in weak antilocalization measurements. These signatures were later used experimentally to confirm the presence of a ~1meV spin-orbit coupling imprinted in graphene due to proximity with the TMDs. The success of his theory was recognized with an invited review in the prestigious journal Chemical Society Reviews (**Impact factor (2017)**: □ **40.182**), and with **four invited talks** in international conferences.

Currently, he is **Co-PI in a project entitled** "Next Generation Ultralow Power Spin-Orbit Memories", granted by the Competitive Research Grant (call 2018) of the King Abdullah University of Science and Technology (KAUST), where he will apply his numerical method to determine the potential of TMDs heterostructures for ultrafast, nonvolatile, spin-based memories.

During his career, he has published **16 articles, 11 of them** in **Q1** journals such as Physical Review Letters, Chemical Society Reviews, Nano Letters, and 2D materials. Accumulating a total of **163 citations, h-index of 8**, **five articles** as the **main author,** and one article selected as **editors suggestion in Physical Review B**.

He also was awarded a **Grant from the Red Español de SuperComputación** for organizing the workshop entitled: "High-Performance Computing for Next Generation Nanomaterials & Nanodevice Engineering (HPCnano)".

His Ph.D. was funded by a competitive scholarship granted by the "Conselho Nacional del Pesquisa e desenvolmento" (CNPq) in Brazil, and he received "Alto rendimiento académico" award by the Central University of Venezuela (UCV) for holding the second highest scores of his graduation class. As an undergrad, the Central Universiy of Venezuela also award him **three times** with the **"Prémio al mérito estudiantil"** award for different categories: Mención rendimiento academico (2008), Mención innovación emprendedora (2009), Mención investigación (2010).

General quality indicators of scientific research

This section describes briefly the main quality indicators of scientific production (periods of research activity, experience in supervising doctoral theses, total citations, articles in journals of the first quartile, H index...). It also includes other important aspects or peculiarities.

ARTICLES

16 published articles in indexed journals
11 published articles in indexed journals **Q1 journals.**
Total **number of citations 163**, average **number of citations of 10,2,** and **h-index 8** (2019).
5 main author articles.

Number of articles published in **featured journals**
2 Physical Review Letters **(1 Main author).**
2 NanoLetters **(1 Main author)**
1 Chemical Society Review **(Invited, main author)**
5 Physical Review B, **1 editor's suggestion. (2 main author)**

COMPETITIVE PROJECTS
Participation in 3 competitive projects as **researched.**
Participation in 1 competitive projects as **CO-PI.**

CONFERENCES
16 contribution to **conferences.**
1 participation as organizer.
5 invited contributions.
4 oral contributions.
1 lecture contributions.
5 poster contributions.

GRANTS AND AWARDS
1 Competitive grant for organizing a conference
1 **P.h.D. Scholarship** awarded through a competitive process.
4 Excellency awards granted by the Central University of Venezuela as an **undergraduate student**.

REFEREE Physical Review B, Physical Review Letters, 2D materials.

José Hugo Garcia Aguilar

Surname(s): **Garcia Aguilar**
Name: **José Hugo**
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ScopusID: **56873825500**
ResearcherID: **C-9989-2017**
Personal web page: **https://icn2.cat/en/staff-directory?member=335**

Current professional situation

Employing entity: FUNDACION PRIVADA INSTITUT CATALA DE NANOTECNOLOGIA
Department: Grupo de Nanociencia teórica y computacional
Professional category: Postdoctoral Researcher
Start date: 02/05/2016
Type of contract: Temporary employment contract **Dedication regime:** Full time
Primary (UNESCO code): 221111 - Electron transport properties; 221120 - Metallic conductora
Secondary (UNESCO code): 331208 - Máterial properties
Performed tasks: My main functions at ICN2 is to perform numerical simulations of the electronic properties of different two-dimensional materials, in order to determine their potential for future electronic devices. For this, I use an efficient and fully scalable code developed by me during my P.h.D thesis, which allows for simulating systems of realistic sizes consisting of hundreds of millions of atoms. This work is performed under the scope of the Graphene Flagship, Tocha Project, and CRF-CRG 2018 projects.

Previous positions and activities

	Employing entity	Professional category	Start date
1	South American Institute of Fundamental Research, ICPT-SAIFR-IFT	Postdoctoral Researcher	01/08/2015
2	Universidad Federal de Rio de Janeiro	Cluster Manager	01/05/2012
3	Universidad Central De Venezuela	Instructor Contratado	16/03/2011

1 **Employing entity:** South American Institute of Fundamental Research, ICPT-SAIFR-IFT **Type of entity:** University Research Institute
Professional category: Postdoctoral Researcher
Start-End date: 01/08/2015 - 30/04/2016 **Duration:** 9 months - 29 days

2 **Employing entity:** Universidad Federal de Rio de Janeiro **Type of entity:** University
Professional category: Cluster Manager
Start-End date: 01/05/2012 - 01/05/2015 **Duration:** 3 years

3 **Employing entity:** Universidad Central De Venezuela
Type of entity: University
Professional category: Instructor Contratado
Start-End date: 16/03/2011 - 31/01/2012
Duration: 10 months - 15 days

Education

University education

1st and 2nd cycle studies and pre-Bologna degrees

University degree: Higher degree
Name of qualification: Licenciado en Física Opcion Fisica Computacional
Degree awarding entity: Universidad Central de Venezuela **Type of entity:** University
Date of qualification: 10/10/2011

Doctorates

Doctorate programme: Doctor en Fisica
Degree awarding entity: Universidade Federal Do Rio de Janeiro **Type of entity:** University
Date of degree: 01/06/2015

Language skills

Language	Listening skills	Reading skills	Spoken interaction	Speaking skills	Writing skills
English	C1	C1	C1	C1	C1
Portuguese	C2	C2	C2	C2	C2

Teaching experience

General teaching experience

1 **Name of the course:** Fisica Experimental I
University degree: Graduado o Graduada en Ingeniería Eléctrica
Start date: 01/04/2013 **End date:** 30/09/2013
End date: 30/09/2013
Entity: Universidade Federal Do Rio de Janeiro **Type of entity:** University
Faculty, institute or centre: Ciencias

2 **Name of the course:** Mecánica
University degree: Licenciado o Licenciada en Física
Start date: 01/03/2011 **End date:** 01/07/2011
End date: 01/07/2011
Entity: Universidad Central de Venezuela **Type of entity:** University
Faculty, institute or centre: Facultad de Ciencias

Scientific and technological experience

Research and development groups/teams

Name of the group: Theoretical and Computational Nanoscience Group
Aims of the group: Explorar las propiedades electronicas y espíntronicas del grafeno para nuevos dispositivos tecnológicos
Name of principal investigator: Stephan Roche
Standardised code: 2017 SGR 692
Type of collaboration: Co-authorship of projects and their development
City of group: Barcelona, Catalonia, Spain
Affiliation entity: FUNDACION PRIVADA INSTITUT CATALA DE NANOTECNOLOGIA
Start date: 02/05/2016
Duration: 2 years - 8 months - 12 days

Scientific or technological activities

R&D projects funded through competitive calls of public or private entities

1 **Name of the project:** TOCHA
Entity where project took place: MULTIPLES
Funding entity or bodies:
Comisión Europea
Type of entity: Internacional
City funding entity: Madrid, Community of Madrid, Spain

Start-End date: 01/01/2019 - 31/12/2023
Total amount: 4.997.803,75 €

2 **Name of the project:** CRF-CRG 2018
Entity where project took place: MULTIPLES
Funding entity or bodies:
King Abdullah University of Science and Technology (KAUST)
Type of entity: University
City funding entity: Saudi Arabia

Start-End date: 01/04/2019 - 01/04/2022
Total amount: 1.180.663,51 €

3 **Name of the project:** GRAPHENE FLAGSHIP CORE 2
Entity where project took place: MULTIPLES
Name principal investigator (PI, Co-PI....): jari Kinaret
Nº of researchers: 120
Funding entity or bodies:
European Commission

Start-End date: 01/04/2018 - 31/03/2020
Total amount: 88.000.000 €

4 **Name of the project:** Spin Manipulation in Dirac Matter (MASPINDIRAC)
Entity where project took place: FUNDACION PRIVADA INSTITUT CATALA DE NANOTECNOLOGIA
City of entity: Barcelona, Catalonia, Spain
Name principal investigator (PI, Co-PI....): Stephan Roche
Nº of researchers: 5
Funding entity or bodies:
Ministerio de Economía y Empresa **Type of entity:** Ministerio
City funding entity: Madrid, Community of Madrid, Spain

Start-End date: 01/01/2016 - 31/12/2018
Total amount: 47.432 €

5 **Name of the project:** GRAPHENE FLAGSHIP CORE 1
Entity where project took place: MULTIPLES
Name principal investigator (PI, Co-PI....): jari Kinaret
Nº of researchers: 154
Funding entity or bodies:
European Commission

Start-End date: 01/10/2013 - 01/04/2018
Total amount: 86.500.000 €

Scientific and technological activities

Scientific production

H index: 8
Date of application: 08/01/2019

Publications, scientific and technical documents

1 C. K. Safeer; Josep Ingla-Aynés; Herling; José H. Garcia; Vila; Nerea Ontoso; M. Reyes Calvo; Stephan Roche; Luis E. Hueso; Fèlix Casanova. Room-Temperature Spin Hall Effect in Graphene/MoS2 van der Waals Heterostructures. NanoLetters. 10.1021/acs.nanolett, ACS, 04/01/2019.
Type of production: Scientific paper **Format:** Journal

2 Søren Schou Gregersen; Jose H Garcia; Antti-Pekka Jauho; Stephan Roche; Stephen R Power. Charge and spin transport anisotropy in nanopatterned graphene. JPhys Materials. 1 - 1, IOP, 18/09/2018.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

3 J M Marmolejo-Tejada; J H García; M D Petrović; P-H Chang; X-L Sheng; A Cresti; P Plecháč; Stephan Roche; Branislav K. Nikolić. Deciphering the origin of nonlocal resistance in multiterminal graphene on hexagonal-boron-nitride with ab initio quantum transport: Fermi surface edge currents rather than Fermi sea topological valley currents. JPhys Materials. 1 - 1, IOP, 18/09/2018.
Type of production: Scientific paper **Format:** Journal

4 Luis M. Canonico; Jose H. Garcia; Tatiana G. Rappoport; Aires Ferreira; Roberto B. Muniz. Shubnikov-de Haas oscillations in the anomalous Hall conductivity of Chern insulators. Physical Review B. 98 - 085409, APS, 08/2018.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

5 Claudia Gomes Da Rocha; Alexandre Rocha; Pedro Venezuela; Jose Hugo Garcia; Mauro Ferreira. Finite-size correction scheme for supercell calculations in Dirac-point two-dimensional materials. Scientific Reports. 8 - 9348, NATURE PUBLISHING GROUP, 06/2018.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

6 Jose H. Garcia; Marc Vila; Aron W. Cummings; Stephan Roche. Spin transport in graphene/transition metal dichalcogenide heterostructures. Chemical Society Reviews. 47, pp. 3359 - 3379. The Royal Society of Chemistry, 04/2018.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

7 Simon Zihlmann; Aron W. Cummings; Jose H. Garcia; Máté Kedves; Kenji Watanabe; Takashi Taniguchi; Christian Schönenberger; Péter Makk. Large spin relaxation anisotropy and valley-Zeeman spin-orbit coupling in WSe2 /graphene/ h -BN heterostructures. Physical Review B. 97 - 075434, APS, 2018.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

8 Tarik P. Cysne; Jose H. Garcia; Alexandre R. Rocha; Tatiana G. Rappoport. Quantum Hall effect in graphene with interface-induced spin-orbit coupling. Physical Review B. 97 - 085413, APS, 2018.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

9 Aron W. Cummings; Jose H. Garcia; Jaroslav Fabian; Stephan Roche. Giant Spin Lifetime Anisotropy in Graphene Induced by Proximity Effects. Physical Review Letters. 119 - 206601, APS, 11/2017.
Type of production: Scientific paper **Format:** Book
Corresponding author: No

10 Jose H. Garcia; Aron W. Cummings; Stephan Roche. Spin Hall Effect and Weak Antilocalization in Graphene/Transition Metal Dichalcogenide Heterostructures. NanoLetters. 17 - 8, pp. 5078 - 5083. ACS, 07/2017.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

11 Mikkel Settnes; Jose H. Garcia; Stephan Roche. Valley-polarized quantum transport generated by gauge fields in graphene. 2D Materials. 4 - 3, IOP, 07/2017.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

12 Alessandro Cresti; Branislav K. Nikolić; Jose H. Garcia; Stephan Roche. Charge, spin and valley Hall effects in disordered graphene. LA RIVISTA DEL NUOVO CIMENTO. 39 - 587, SIF, Bologna, 12/2016.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

13 Jose H. Garcia; Tatiana G. Rappoport. Kubo-Bastin approach for the spin Hall conductivity of decorated graphene. 2D Materials. 3 - 024007, IOP, 05/2016.
Type of production: Scientific paper **Format:** Book

Corresponding author: Yes

14 Diego Oliver; Jose H. Garcia; Tatiana G. Rappoport; Nuno Peres; Felipe A. Pinheiro. Cloaking resonant scatterers and tuning electron flow in graphene. Physical Review B. 91 - 155416, APS, 04/2015.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

15 Jose H. Garcia; Lucian Covaci; Tatiana G. Rappoport. Real-Space Calculation of the Conductivity Tensor for Disordered Topological Matter. Physical Review Letters. 114 - 116602, APS, 03/2015.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

16 Jose Hugo Garcia; Bruno Uchoa; Lucian Covaci; Tatiana G. Rappoport. Adatoms and Anderson localization in graphene. Physical Review B. 90 - 085425, APS, 08/2014.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

Works submitted to national or international conferences

1 **Title of the work:** (INVITED)The kernel polynomial method for spintronics and quantum transport: Toward quantum simulation of macroscopic devices.
Name of the conference: Gathering on Transport at the Nanoscale
Corresponding author: Yes
City of event: Cuernavaca, Mexico
Date of event: 29/10/2018
End date: 09/11/2018
Organising entity: CICC - UNAM **Type of entity:** University
City organizing entity: Mexico
Jose Garcia; Marc Vila; Aron W. Cummings; Stephan Roche. "Spin transport in graphene/transition metal dichalcogenide heterostructures".

2 **Title of the work:** (ORAL) Spin-orbitronics in graphene/Transition Metal Dichalcogenide heterostructures
Name of the conference: 9 th JEMS Conference 2018
Corresponding author: Yes
City of event: Mainz, Rheinhessen-Pfalz, Germany
Date of event: 03/09/2018
End date: 07/09/2018
Organising entity: European Magnetism Association
Jose H. Garcia; Marc Vila; Aron W. Cummings; Stephan Roche. "Spin transport in graphene/transition metal dichalcogenide".

3 **Title of the work:** (ORAL) Spin transport in graphene/transition metal dichalcogenide heterostructures
Name of the conference: Graphene 2018
Corresponding author: Yes
City of event: Dresden, Dresden, Germany
Date of event: 26/06/2018
End date: 29/06/2018
Organising entity: Phantom Foundation
Marc Vila; Aron W. Cummings; Stephan Roche. "Spin transport in graphene/transition metal dichalcogenide heterostructures".

4 **Title of the work:** (ORGANIZER) Scalable iterative methods to compute non-equilibrium in gigascale systems.
Name of the conference: HPCnano High Performance Computing for Next Generation Nanomaterials & Nanodevice Engineering
Corresponding author: Yes
City of event: Barcelona, Catalonia, Spain
Date of event: 30/05/2018
End date: 31/05/2018
Organising entity: ICN2-RES **Type of entity:** R&D Centre
City organizing entity: Barcelona, Catalonia, Spain
Jose H. Garcia; Marc Vila; Stephan Roche.

5 **Title of the work:** (INVITED) Spin Hall Effect and Weak Antilocalization in Graphene/Transition Metal Dichalcogenide Heterostructures
Name of the conference: NanoPT2018
Corresponding author: Yes
City of event: Lisboa, Lisboa, Portugal
Date of event: 07/02/2018
End date: 09/02/2018
Organising entity: Phantom Foundation **Type of entity:** Associations and Groups
Jose H. Garcia Aguilar; Aron W. Cummings; Stephan Roche. "Spin Hall Effect and Weak Antilocalization in Graphene/Transition Metal Dichalcogenide Heterostructures".

6 **Title of the work:** (INVITED) Tailoring Spin Dynamics through Proximity Effects in Graphene/Transition Metal Dichalcogenide Heterostructures
Name of the conference: Spain-Taiwan Workshop on 2D Materials and Interfaces for Spintronics
Corresponding author: Yes
City of event: Barcelona, Catalonia, Spain
Date of event: 23/10/2017
End date: 25/10/2017
Organising entity: Phantom Foundation **Type of entity:** Foundation
Jose H. Garcia; Aron W. Cummings; Stephan Roche. "Spin transport in graphene/transition metal dichalcogenide heterostructures".

7 **Title of the work:** (INVITED) Charge and spin Hall Kubo conductivity by O(N) real-space methods
Name of the conference: 11th RES Users' Conference and 6th HPC Advisory Council Spain Conference
Corresponding author: Yes
City of event: Santiago de Compostela, Galicia, Spain
Date of event: 28/09/2017
End date: 29/09/2017
Organising entity: Red Española de Supercomputación
City organizing entity: Spain
Jose H. Garcia; Stephan Roche.

8 **Title of the work:** (POSTER) A bulk perspective of Valley Hall Effect in graphene
Name of the conference: Graphene 2017
Corresponding author: No
City of event: Barcelona, Catalonia, Spain
Date of event: 28/05/2017
End date: 31/05/2017
Organising entity: Phantom Foundation **Type of entity:** Foundation

Jose H. Garcia Aguilar; Alessandro Cresti; Branislav K. Nikolić; Stephan Roche. "Deciphering the origin of nonlocal resistance in multiterminal graphene on hexagonal-boron-nitride with ab initio quantum transport: Fermi surface edge currents rather than Fermi sea topological valley currents".

9 **Title of the work:** (INVITED) Spin Hall Effect in Graphene
Name of the conference: XXXVIII Encontro Nacional de Física da Matéria Condensada
Corresponding author: Yes
City of event: Foz de Iguaçu, Brazil
Date of event: 24/05/2015
End date: 28/05/2015
Organising entity: Sociedade Brasileira de Fisica **Type of entity:** Associations and Groups
City organizing entity: Brazil
Jose H. Garcia; Tatiana G. Rappoport. "Kubo–Bastin approach for the spin Hall conductivity of decorated graphene".

10 **Title of the work:** (ORAL) Real-Space Calculation of the Conductivity Tensor for Disordered Topological Matter
Name of the conference: APS March Meeting 2015
Corresponding author: Yes
City of event: San Antonio Texas, United States of America
Date of event: 02/03/2015
End date: 06/03/2015
Organising entity: APS **Type of entity:** Associations and Groups
City organizing entity: United States of America
Jose H. Garcia; Lucian Covaci; Tatiana G. Rappoport. "Real-Space Calculation of the Conductivity Tensor for Disordered Topological Matter".

11 **Title of the work:** (POSTER) Real-Space Calculation of the Conductivity Tensor for Disordered Topological Matter
Name of the conference: 5º Encontro INCT de Nanomateriais de Carbono
Corresponding author: Yes
City of event: Belo Horizonte, Brazil
Date of event: 19/09/2014
End date: 21/09/2014
Organising entity: INCT **Type of entity:** State agency
City organizing entity: Brazil
Jose H. Garcia; Lucian Covaci; Tatiana G. Rappoport. "Real-Space Calculation of the Conductivity Tensor for Disordered Topological Matter".

12 **Title of the work:** (ORAL) Adatoms and Anderson Localization in Graphene
Name of the conference: Graphene 2014
Corresponding author: Yes
City of event: Toulouse, France
Date of event: 06/05/2014
End date: 09/05/2014
Organising entity: Phantom Foundation **Type of entity:** Foundation
Jose H. Garcia; Bruno Uchoa; Lucian Covaci; Tatiana G. Rappoport. "Adatoms and Anderson Localization in Graphene".

13 **Title of the work:** (POSTER) Heavy adatoms and Anderson localization in graphene
Name of the conference: Graphene Brazil 2013
City of event: Buzios, Brazil

Date of event: 22/09/2013
End date: 25/09/2013
Organising entity: INCT **Type of entity:** State agency
City organizing entity: Brazil
Jose H. Garcia; Bruno Uchoa; Lucian Covaci; Tatiana G. Rappoport. "Adatoms and Anderson Localization in Graphene".

14 **Title of the work:** (POSTER) Adatoms and Anderson localization in graphene
Name of the conference: 4to Encontro do INCT de Nanomateriais de Carbono
Corresponding author: Yes
City of event: Goiânia, Brazil
Date of event: 22/10/2012
End date: 30/10/2012
Organising entity: INCT de Nanomateriais de Carbono **Type of entity:** R&D Centre
Jose H. Garcia Aguilar; Bruno Uchoa; Lucian Covaci; Tatiana G. Rappoport. "Adatoms and Anderson localization in graphene".

15 **Title of the work:** (LECTURE) Maple for Scientists
Name of the conference: Congreso Estudiantil de Investigación y Desarrollo
City of event: Caracas, Venezuela
Date of event: 2010
End date: 2010
Organising entity: CEIDEC/UCV **Type of entity:** University
City organizing entity: Caracas, Venezuela
Jose H. Garcia Aguilar.

16 **Title of the work:** (POSTER)A Deterministic Approach to the Synchronization of Cellular Automata.
Name of the conference: VII Congreso de la Sociedad Venezolana de Física
Corresponding author: Yes
City of event: Caracas, Venezuela
Date of event: 2009
End date: 2009
Organising entity: Sociedad Venezolana de Física **Type of entity:** Associations and Groups
City organizing entity: Caracas, Venezuela
Jose H. Garcia Aguilar; Pedro Garcia. "A Deterministic Approach to the Synchronization of Cellular Automata.".

R&D management and participation in scientific committees

Organization of R&D activities

Title of the activity: The Workshop on High Performance Computing for Next Generation Nanomaterials & Nanodevice Engineering (HPCnano)
Type of activity: Workshop **Geographical area:** European Union
Convening entity: Red Española de Supercomputación
City convening entity: Barcelona, Catalonia, Spain
Start-End date: 01/02/2018 - 31/05/2018 **Duration:** 3 months - 30 days