

**Project:
MaNaCa**

(Grant Agreement number 857502)

“Magnetic Nanohybrids for Cancer Therapy ”

Funding Scheme: Coordination and Support Action

Call: H2020-WIDESPREAD-2018-2020 / H2020-WIDESPREAD-2018-03

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**D4.3 Year 2 report on Events
(Workshops, Summer Schools,
Conferences)**

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PU	Public	X
PP	Restricted to other program participants (including the EC Services)	
RE	Restricted to a group specified by the consortium (including the EC Services)	
CO	Confidential, only for members of the consortium (including the EC)	

The MaNaCa project intends to develop the scientific and technological capacity as well as raising the research profile of the Institute for Physical Research of the National Academy of Sciences (IPR-NAS) in Armenia. From a scientific standpoint, MaNaCa will focus on the structural and magnetic characterization of magnetic nanohybrids and their application for cancer therapy. The project's aim will be accomplished by networking IPR-NAS with two internationally-leading research organisations: the Aristotle University of Thessaloniki (AUTH) in Greece and the University of Duisburg – Essen (UDE) in Germany. Throughout the project, the research partners will be supported for management and dissemination by Intelligentsia Consultants Sàrl (INT), a consultancy company based in Luxembourg which has already collaborated on several occasions with the Widening partner. During the project, which will have a total duration of three years, the partners will carry out a research and innovation strategy with these objectives:

1. Stimulating scientific excellence and innovation capacity of IPR-NAS regarding magnetic nanohybrids for cancer therapy.
2. Improve the career prospects of early-stage researchers of IPR-NAS and the Twinning partners
3. Raise the research profile of IPR-NAS and the Twinning Partners

In order to accomplish this task, the consortium partners will implement several actions through the project's work packages: (WP1) exchange of senior researchers; (WP2) exchange of early-stage researchers; and (WP3) dissemination and outreach. Project management (WP4) will be coordinated by IPR-NAS with the support of INT. In addition to staff exchanges, project's activities will include technical training, joint publications, joint participation to conferences, organization of summer schools, workshops and an international conference.

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Table of Contents

1. Executive Summary	4
2. Training Workshops	5
2.1 3 rd Training workshop during 16-18 June 2021 (Zoom)	5
2.2 4 th Training workshop during 21-22 September 2021 (Hybrid: Zoom/Ashtarak)	6
1. Summer Schools	9
1.1 2 nd Summer School during 16-18 June 2021 (Zoom).....	9
2. Conferences	12

1. Executive Summary

During Year 2 the consortium partners have successfully held two training workshops and one summer school thereby reaching Milestone 3 (2 workshops organized during Year 2) and Milestone 5 (1 summer school organized during Year 2) of the project:

- 3rd Training Workshop during 16-18 June 2021 (Zoom/organized by UDE).
- 4th Training Workshop during 21-22 September 2021 (Zoom/organized by IPR NAS).
- 2nd Summer School during 16-18 June 2021 (Zoom/organized by UDE).

The partners have presented the MaNaCa project's activities and its results at following international conferences:

- 84th Annual Meeting of the German Physical Society (GPS) and GPS Meeting of the Condensed Matter Section, Berlin, Germany, 27.09.-01.10.2021
<https://www.dpg-physik.de/veranstaltungen/2021/85-jahrestagung-der-dpg-und-dpg-fruehjahrstagung-der-sektion-kondensierte-materie>
- XXXV Panhellenic Conference on Solid State Physics and Materials Science, 26-29 September 2021, Athens, Greece
<http://xxxv-ssm.inn.demokritos.gr>
- APS March Meeting 2021, March 15–19, 2021; Virtual
<https://meetings.aps.org/Meeting/MAR21/Session/R40.10>
- 2021 Around-the-Clock Around-the-Globe Magnetism Conference (AtC-AtG), August 24, 2021, Virtual
https://ieeemagnetics.org/images/stories/atc_atg_program_booklet%2023080123.pdf
- 6th international advanced school "Frontiers in Optics & Photonics" 30 August – 11 September, 2021, Yerevan-Ashtarak, Armenia
- The annual International Conference Laser Physics 2021, 21–24 September 2021, Ashtarak, Armenia

2. Training Workshops

2.1 3rd Training workshop during 16-18 June 2021 (Zoom)

Due to the COVID-19 pandemic and the lockdown situation across Europe in 2021, the 3rd Training Workshop combined with the 2nd Sommer School was held during 16-18 June 2021 as an online event.

The Training Workshop aimed at providing information and training that will help to improve the career prospects of early-stage researchers of IPR NAS and the twinning partners: UDE and AUTH.

The training workshop included talks on creativity and problem solving, academic career paths in Germany and Europe. The current EU funding programs for early-stage researchers were presented by the *EU officer of the Science Support Centre of UDE, Dr. Sara Letzner*. Several talks addressed the correct processing and analysis of experimental data.

98 people from 13 countries attended the Workshop. Among them were 70% graduated and postgraduate students, 48% of participants are female.

The full list of participants of the workshop is provided in Annex 1.

Program for the 3rd Training Workshop

“Magnetic nanoparticles for bio-applications”

Friday, 18.06.2021

GER	GR	ARM	
9:00 10:30	10:00 11:30	12:00 13:30	Flavien Massi <i>Intelligentsia Consultants Sàrl, Luxembourg</i> Creativity and problem solving
10:30 11:00	10:30 11:15	11:30 12:15	Coffee break
11:00 12:00	12:00 13:00	13:00 14:00	Simon Kresmann <i>Graduate Center Plus, University of Duisburg-Essen, Germany</i> Academic career paths in Germany and Europe
12:00 12:45	13:00 13:45	14:00 14:45	Sara Letzner <i>EU officer Science Support Centre, University of Duisburg-Essen, Germany</i> EU funding programs for early-career researchers
12:45 14:00	13:45 15:00	14:45 16:00	Lunch
14:00 14:45	15:00 15:45	16:00 16:45	Sara Liebana Viñas <i>Evonik Industries AG, Germany</i> Great start at Evonik as a Spanish chemist
14:45 15:30	15:45 16:30	16:45 17:30	Hongbin Zhang <i>Technical University of Darmstadt, Germany</i> Introduction to Python programming language
15:30 16:00	16:30 17:00	17:30 18:00	Coffee break
16:00 17:00	17:00 18:00	18:00 19:00	Michael Farle <i>University of Duisburg-Essen, Germany</i> Hands-on approach of fitting experimental spectra
			Closing

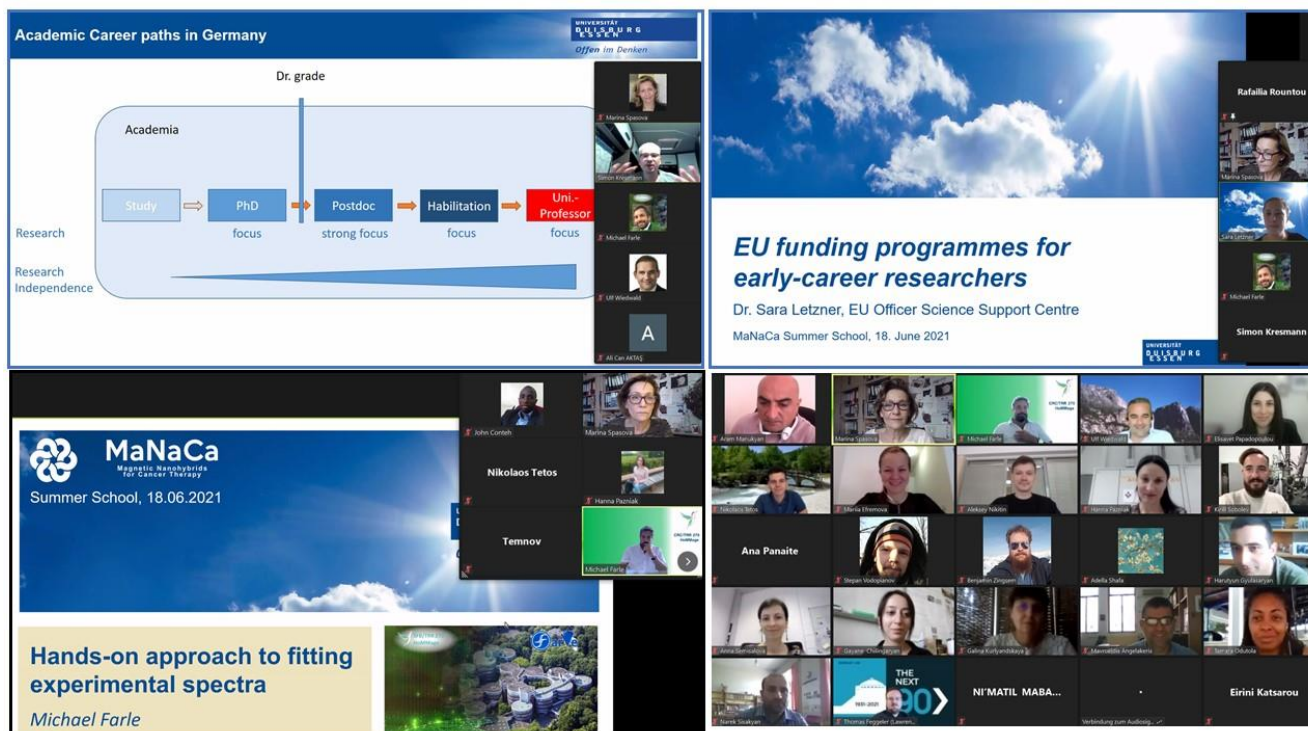
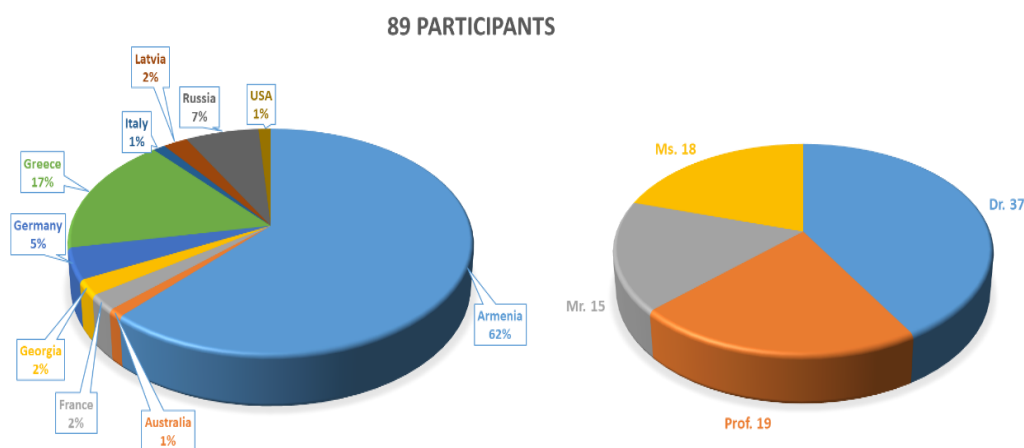


Figure 1: Screenshots during the 3rd Training workshop on 18 June 2021 (Zoom)

2.2 4th Training workshop during 21-22 September 2021 (Zoom/organized by IPR NAS)

The 4th training workshop held during 21-22 September 2021. On the first day, a joint session of the MaNaCa seminar and the "Laser Physics-2021" international conference, organized by IPR-NAS took place in Ashtarak, as a hybrid event. On the second day, the MaNaCa workshop has been conducted by Zoom/online. The Training Workshop focused on the functional magnetic nanoparticles synthesis, their complex structural and magnetic investigations and application in cancer therapy. The researchers from the MaNaCa consortium partners were also informed about various cancer treatment methods.

A special feature of the training workshop was the participation of a number of Armenian groups engaged in the field of cancer therapy. The current Horizon Europa programs for twinning partners were presented by the Head of International S&T Programmes Department of The National Academy of Sciences of RA, Tigran Arzumanyan.



89 people from 10 countries attended the "MaNaCa meets Laser Physics" event. Among them were 19 Professors, 37 Doctors and 33 early-stage researchers (Fig.2).

The full list of participants of the workshop is provided in Annex 2.

Figure 2: Breakdown of the participants in the 4th Training Workshop.



Program



4th H2020 MaNaCa Training Workshop Magnetic Nanohybrids for Cancer Therapy

21-22 September, 2021, Ashtarak, Armenia
Hybrid event

September 21, 2021

Zoom details: [Link to Laser Physics 2021](#), [Passcode: 556416](#)

“MaNaCa meets to Laser Physics” session

Chairman: **Aram Papoyan**

10:00-11:00	Registration
11:00-11:10	Opening <i>Aram Papoyan (IPR NAS RA), David Sarkisyan (IPR NAS RA), Aram Manukyan (IPR NAS RA)</i>
11:00-11:30	Introduction to the EU H2020 MaNaCa project <i>Aram Manukyan (IPR NAS RA)</i>
11:30-12:00	Synthesis, Structure and Magnetic Properties of Carbon Encapsulated Fe/Fe₃C Nanoparticles as Magnetic Heating Mediators <i>Narek Sisakyan (IPR NAS RA)</i>
12:00-12:30	Determination of weak and strong magnetic fields using atomic spectroscopy <i>David Sarkisyan (IPR NAS RA)</i>
12:30-13:00	Development of nanoparticles for the combined localized therapy of cancer adjacent to proton therapy, and evaluation of their acute toxicity to mammals <i>Archil Chirakadze (Georgian Technical University)</i>
13:00-13:30	Coffee break
Chairmen: David Sargsyan	
13:30-14:00	Biophysics of cancerogenesis: new trends and perspectives <i>Naira Ayyazyan (Orbeli Institute of Physiology)</i>
14:00-14:30	New therapeutic approaches of combinations of plant-derived and chemotherapeutic compounds in anti-cancer therapy <i>Nikolay Avtandilyan (Yerevan State University)</i>
14:30-15:00	Comparative analysis of chemical and biogenic Fe₃O₄ NPs biocompatibility and toxicity <i>Ashkhen Hovhannisyan (Russian-Armenian University)</i>
15:00-15:30	Possible Role of Water in Carcinogenesis and Influence of Non-Ionizing and Non-Thermal Electromagnetic Radiation (Millimeter Waves) <i>Vitali Kalantaryan (Yerevan State University)</i>
15:30-18:00	Welcome Party

22 September, 2021	
Zoom details: Link to 4th MaNaCa workshop Passcode: 008479	
Chair Person: Marina Spasova	
11:00-11:30	Magnetic nanohybrids as magnetic heating mediators <i>Makis Angelakeris (Aristotle University of Thessaloniki)</i>
11:30-12:00	Structure and Magnetic Properties Fe/Fe₃C Nanoparticles Prepared by Solid-Phase Pyrolysis of Iron Phthalocyanine <i>Harutyun Gyulasaryan (IPR NAS RA)</i>
12:00-12:30	Photoelectron and X-ray spectroscopy at the Kurchatov synchrotron radiation source <i>Ratibor Chumakov (National Research Centre "Kurchatov institute")</i>
12:30-13:00	Atomic structure of iron-containing core-shell nanoparticles: EXAFS and MD <i>Leon Avakyan (SFEDU)</i>
13:00-14:00	Coffee break
Chairmen: Aram Manukyan	
14:00-15:00	Horizon Europe: Widening participation and strengthening the European Research Area programme overview <i>Tigran Arzumanyan (NAS RA)</i>
15:00-15:30	Coffee break
Chairmen: Makis Angelakeris	
15:30-16:30	Developments in pediatric oncology in the Republic of Armenia <i>Gevorg Tamamyan (Yerevan State Medical University)</i>
16:30-17:00	Photoactive Complexes for Photodynamic Therapy of Tumors <i>Grigor Gyulkhandaryan (Institute of Biochemistry NAS RA)</i>
17:00-17:30	Theranostic nanostructured media for biomedical applications <i>Karen Martirosyan (University of Texas Rio Grande Valley)</i>
17:30-17:45	Closing

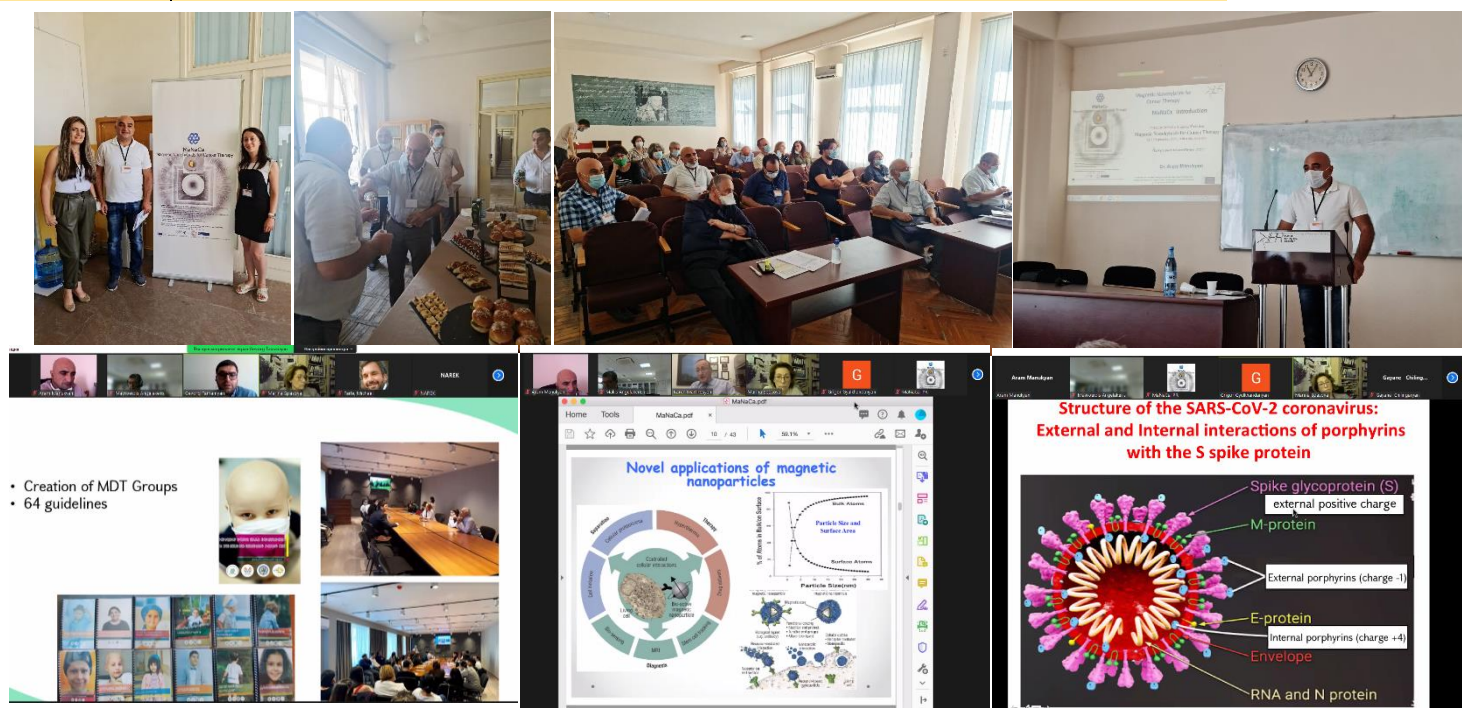


Figure 3: Some photos and screenshots during the 4th Training workshop on 21-22 September 2021.

3. Summer Schools

3.1 2nd Summer School during 16-18 June 2021 (Hybrid: Zoom/Duisburg-Essen)

Due to the COVID-19 pandemic and the lockdown situation across Europe in 2021, the 2nd Sommer School was held 16-18 June 2021 as an online event.

The school aimed at providing a thorough understanding of magnetism based on fundamental lectures while offering the latest insights into up-to-date aspects of research on magnetic nanoparticles for theranostics and bio-censoring.

The school was addressed to graduate and PhD students, as well as to post-doc and young researchers.

The school's programme consisted of two-days of tutorial lectures devoted to bio-applications of magnetic nanoparticles and advanced methods for magnetic characterization. The lectures were provided by prominent scientists active in today's research.

Program for the 2nd Summer School: "Magnetic nanoparticles for bio-applications"

Wednesday, 16.06.21: *Magnetic Nanoparticles for Bio-Applications*

GER	GR	ARM	
9:00 9:30	10:00 10:30	11:00 11:30	Opening/ZOOM Test Welcome
9:30 10:15	10:30 11:15	11:30 12:15	Maxim Abakumov <i>Pirogov Russian National Research Medical University</i> Magnetic nanoparticles in cancer theranostics
10:15 10:40	11:15 11:40	12:15 12:40	Alexey Nikitin <i>Pirogov Russian National Research Medical University</i> Magnetic nanoparticles: a little bit more than just nanomedicine
10:40 11:00	11:40 12:00	12:40 13:00	Coffee break
11:00 11:45	12:00 12:45	13:00 13:45	Verónica Salgueiriño <i>University of Vigo, Spain</i> Taking advantage of the Magnetic Functionality in Self-propelled Swimmers
11:45 12:30	12:45 13:30	13:45 14:30	Maria Efremova <i>Technical University of Munich, Germany</i> Iron (oxide) / gold nanoparticles - what can we learn from them?
12:30 13:30	13:30 14:30	14:30 15:30	Lunch
13:30 14:15	14:30 15:15	15:30 16:15	Galina Kurlyandskaya <i>University of the Basque Country UPV-EHU, Bilbao, Spain</i> Magnetic biosensors - multidisciplinary area of research and biomedical applications
14:15 15:30	15:15 16:30	16:15 17:30	Yuliya Alekhina <i>Lomonosov Moscow State University, Russia</i> Magnetorheological materials: widening biomedical horizons
15:30 16:00	16:30 17:00	17:30 18:00	Coffee break
16:00 16:45	17:00 17:45	18:00 18:45	Iuliia Novoselova <i>Heinrich-Heine University, Düsseldorf, Germany</i> Bioinspired magnetic nanoprobe for mechanical and hyperthermal manipulation in single cells

Thursday, 17.06.2021

Advanced Methods for Investigating Magnetic Properties

GER	GR	ARM	Chairman
9:00 10:00	10:00 10:30	11:00 11:30	Ralf Meckenstock <i>University of Duisburg-Essen, Germany</i> FMR as a tool for nano scaled magnetic characterization
10:00 11:00	11:00 12:00	12:00 13:00	Sara Laureti <i>Nanostructured Magnetic Materials Lab, Rom, Italy</i> EXAFS characterization of magnetic nanostructures
11:00 11:30	12:00 12:30	13:00 13:30	Coffee break
11:30 12:30	11:30 12:30	12:30 13:30	Andrei Rogalev <i>European Synchrotron Radiation Facility (ESRF), France</i> How X-rays help us to decipher enigmas of magnetism
12:30 13:30	13:30 14:30	14:30 15:30	Lunch
13:30 14:30	13:30 14:30	13:30 14:30	Thomas Feggeler <i>Lawrence Berkeley National Laboratory, USA</i> Element-specific detection of magnetization dynamics using Scanning Transmission X-ray Microscopy
14:30 15:30	15:30 16:30	16:30 17:30	Vasily Temnov <i>University of Le Mans, France</i> Ultrafast magneto-acoustics: ferromagnetic resonance, spin waves and magnetization switching
15:30 16:00	16:30 17:00	17:30 18:00	Coffee break
16:00 17:00	17:00 18:00	18:00 19:00	Anna Semisalova <i>University of Duisburg-Essen, Germany</i> THz emission spectroscopy for the investigation of ultrafast magnetization dynamics

98 people from 13 countries attended the workshop. Among them are 70% of graduated and post-graduated students, 48% of participants are female (Fig.4).

98 Participants

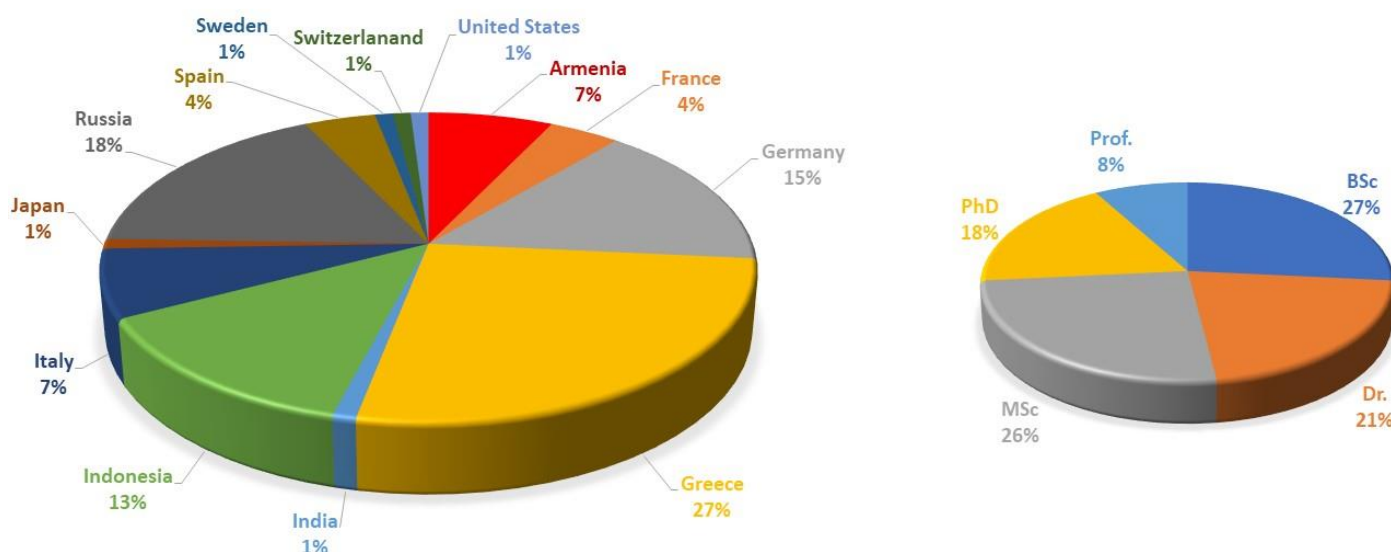


Figure 4: Breakdown of participants in combined 2nd Summer School and 3rd Training Workshop.

The full list of participants of the workshop is provided in Annex 1.

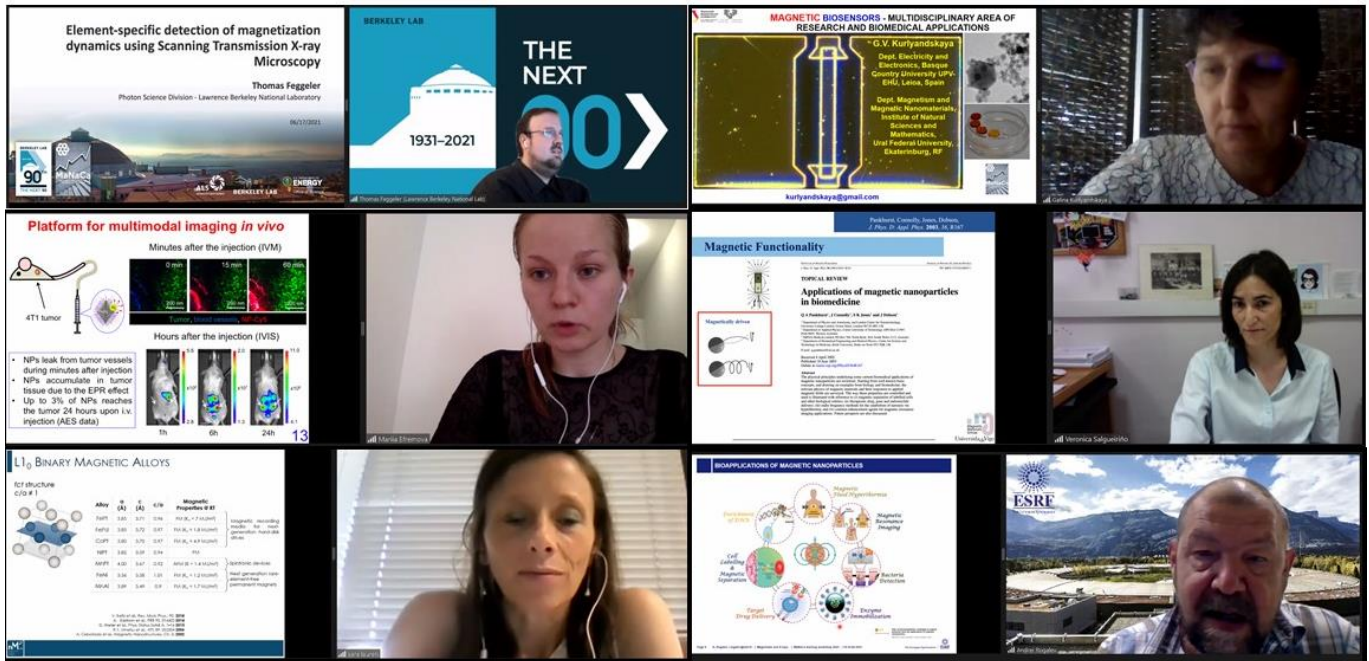


Figure 5: Screen shots during the 2nd Summer school on 16-17 June 2021 (Zoom)

4. Conferences

Name and location of conference	Virtual 84 th Annual Meeting of the German Physical Society (GPS) and GPS Meeting of the Condensed Matter Section
Dates of conference	27.09.-01.10.2021
Name(s) of researcher(s) attending conference	Elisavet Papadopoulou
Title of paper presented at the conference	Structure and magnetism of Fe/Fe ₃ C/Carbon nanocomposites: Influence of the pyrolysis conditions
Title of poster presented at the conference	

Name and location of conference	APS March Meeting 2021, Virtual
Dates of conference	15.03-19.03 2021
Name(s) of researcher(s) attending conference	H. Gyulasaryan, E. Papadopoulou, N. Tetos, G. Chilingaryan, M. Spasova, M. Farle, A. Manukyan, E. Myrovali, M. Angelakeris, K. Castillo, O. Bernal, A. Kocharian
Title of paper presented at the conference	Structure and Magnetism of Fe/Fe ₃ C Nanoparticles in Carbon Spheres
Title of poster presented at the conference	

Name and location of conference	The annual International Conference Laser Physics 2021, Ashtarak, Armenia
Dates of conference	21.09-24.09 2021
Name(s) of researcher(s) attending conference	H. Gyulasaryan, E. Papadopoulou, N. Tetos, G. Chilingaryan, N. Sisakyan, E. Myrovali, A. Makridis, M. Angelakeris, M. Farle, M. Spasova, A. Manukyan
Title of paper presented at the conference	Synthesis, Structure and Magnetic Properties of Carbon Encapsulated Fe/Fe ₃ C Nanoparticles as Magnetic Heating Mediators
Title of poster presented at the conference	

Name and location of conference	The 2021 Around-the-Clock Around-the-Globe Magnetism Conference (AtC-AtG), Virtual
Dates of conference	August 24, 2021
Name(s) of researcher(s) attending conference	Harutyun GYULASARYAN, Narek SISAKYAN, Gayane CHILINGARYAN, Aram MANUKYAN, Antonios MAKRIDIS
Title of paper presented at the conference	Synthesis, Structure, Magnetism and Magnetic Particle Heating Characterization of Fe/Fe ₃ C Nanoparticles in Carbon Matrix
Title of poster presented at the conference	

Name and location of conference	XXXV Panhellenic Conference on Solid State Physics and Materials Science, Athens, Greece
Dates of conference	26-29 September 2021
Name(s) of researcher(s) attending conference	M. Tsompanoglou, A. Makridis
Title of paper presented at the conference	Fe/Fe ₃ C magnetic nanohybrids: Synthesis, features and applications.

MaNaCa, D4.3: Year 2 report on Events (Workshops, Summer Schools, Conferences)

Title of poster presented at the conference	Fe/Fe ₃ C magnetic nanohybrids: Synthesis, features and applications.
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Name and location of conference	6 th international advanced school “Frontiers in Optics & Photonics”, Yerevan-Ashtarak, Armenia
Dates of conference	30 August – 11 September, 2021
Name(s) of researcher(s) attending conference	Harutyun GYULASARYAN, Narek SISAQYAN, Gayane CHILINGARYAN, Aram MANUKYAN
Title of paper presented at the conference	Synthesis and Characterization of Fe/Fe ₃ C Nanoparticles in Carbon Matrix for Magnetic Hyperthermia of Cancer Cells
Title of poster presented at the conference	

5. Events

- On March 24-25, 2021 an online event was held for twinning project coordinators entitled “Twinning projects: Experiences and obstacles” organized by the ELICSIR project team lead by Prof. Goran Ristic (www.elicsir-project.eu). The event was dedicated to the impact of Covid-19 on projects implementation. At this event, the coordinator of the MaNaCa project A. Manukyan presented the essence of the MaNaCa project in detail, as well as the obstacles that have arisen due to Covid-19. The project coordinators also shared their experiences and suggestions to overcome the difficulties caused by the pandemic.



Twinning Project Days Programme

Wednesday, March 24, 2021

- 09:00 Goran Ristić, Serbia: **ELICSIR project** - www.cordis.europa.eu/project/id/857558
- 09:20 Tanja Ćirković Veličković, Serbia: **FoodEnTwin project** - www.cordis.europa.eu/project/id/810752
- 09:40 Liviu Marsavina, Romania: **SIRAMM project** - www.cordis.europa.eu/project/id/857124
- 10:00 Anatolie Sidorenko, Moldova: **SPINTECH project** - www.cordis.europa.eu/project/id/810144
- 10:20 Ivana Gadjanski, Serbia: **DRAGON project** - www.cordis.europa.eu/project/id/810775
- 10:40 Break
- 11:00 Ion Tiginyanu, Moldova: **NanoMedTwin project** - www.cordis.europa.eu/project/id/810652
- 11:20 Natalija Perišić, Serbia: **MIGREC project** - www.cordis.europa.eu/project/id/857261
- 11:40 Ana Kuveždić Divjak, Croatia: **TODO project** - www.cordis.europa.eu/project/id/857592
- 12:00 Aram Manukyan, Armenia: **MaNaCa project** - www.cordis.europa.eu/project/id/857502
- 12:20 Dejan Vukobratović, Serbia: **INCOMING project** - www.cordis.europa.eu/project/id/856967

Thursday, March 25, 2021

- 09:00 Kamen Kozarev, Bulgaria: **STELLAR project** - www.cordis.europa.eu/project/id/952439
- 09:20 Nicolae Lucanu, Romania: **BRAINTWIN project** - www.cordis.europa.eu/project/id/952378
- 09:40 Serhii Dzyadevich, Ukraine: **BIONANOSENS project** - www.cordis.europa.eu/project/id/951887
- 10:00 Nenad Filipović, Serbia: **SGABU project** - www.cordis.europa.eu/project/id/952603
- 10:20 Break
- 10:40 Milena Jovašević-Stojanović, Serbia: **VIDIS project** - www.cordis.europa.eu/project/id/952433
- 11:00 Bojana Obradović, Serbia: **ExcelIMater project** - www.cordis.europa.eu/project/id/952033
- 11:20 Goran Stojanović, Serbia: **GREENELIT project** - www.cordis.europa.eu/project/id/951747
- 11:40 Biljana Basarin, Serbia: **EXtremeClimTwin project** - www.cordis.europa.eu/project/id/952384

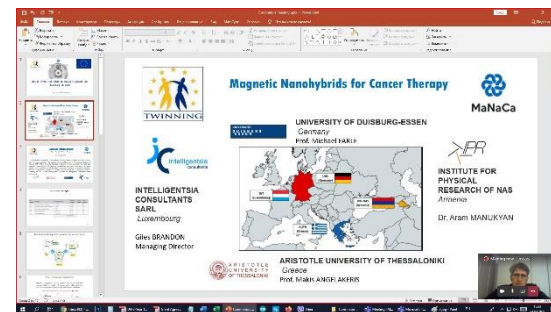


Figure 6: Programme and screenshots of the twinning project coordinators online event on 24-25 March 2021 (Zoom)

2. On August 30, 2021 at IPR-NAS A. Manukyan presented the MaNaCa project as invited lecturer at the 6th international advanced school “Frontiers in Optics & Photonics” held Yerevan-Ashtarak, Armenia, on 30 August – 11 September. Students also had the opportunity to learn about the MaNaCa project in the Solid State Physics Laboratory. N. Sissakian and G. Chilingaryan demonstrated the synthesis of magnetic nanoparticles and their induction heating.



Figure 7: Photos recorded during at the 6th international advanced school “Frontiers in Optics & Photonics”. The synthesis of magnetic nanoparticles and their induction heating were demonstrated for visitors in the lab of Dr. A. Manukyan.

3. On August 12, 2021 at the UDE Summer University for school children, Prof. Michael Farle, Dr. Marina Spasova and Dr. Ulf Wiedwald gave two online lectures “Cancer therapy with tiny magnets: Magnetic nanoparticles in diagnostics and therapy“. Master students Merve Felek and Nora Königstein demonstrated sample preparation in a chemistry lab and heating of magnetic nanoparticles by AC magnetic field.



Figure 8. Pictures from the UDE Summer University for school children.

Annex 1

List of Participants of combined 2nd Summer School and 3rd Training Workshop (16-18 June 2021)

	Title	First name	Last name	Affiliation	City,	Country
1	Prof.	Michael	Farle	University Duisburg-Essen	Duisburg	Germany
2	Prof.	Aram	Manukyan	IPR NAS	Ashtarak	Armenia
3	Prof.	Makis	Angelakeris	Aristotle University of Thessaloniki	Thessaloniki	Greece
4	Dr.	Marina	Spasova	University Duisburg-Essen	Duisburg	Germany
5	MSc	Fauzin	Naimah	Tokyo Institute of Technology	Tokyo	Japan
6	PhD	Konstantina	Kazeli	Aristotle University of Thessaloniki	Thessaloniki	Greece
7	MSc	Nikolaos	Tetos	University Duisburg-Essen	Duisburg	Germany
8	Dr.	Mikhail	Cherkasskii	St. Petersburg State University	St. Petersburg	Russia
9	BSc	Muhammad	Ariasatya Daniswara	Universitas Gadjah Mada	Surabaya	Indonesia
10	PhD	Anna	Pasynkova	Ural federal university	Yekaterinburg	Russia
11	BSc	Michail	Nikitaras	Aristotle University of Thessaloniki	Thessaloniki	Greece
12	BSc	Ioanna Elissavet	Chatziioannou	Aristotle University of Thessaloniki	Thessaloniki	Greece
13	BSc	Ntenia	Vaso	Aristotle University of Thessaloniki	Thessaloniki	Greece
14	BSc	Stergios	Dimitriadis	Aristotle University of Thessaloniki	Thessaloniki	Greece
15	MSc	Salony	Mandloi	UM-DAE Centre for Excellence in Basic Sciences	Mumbai	India
16	MSc	Ivan	Abramovsky	Syktvykar State University	Syktvykar	Russia
17	BSc	Viktor	Arkhovov		Moscow	Russia
18	MSc	Mikhail	Dianov	Syktvykar State University	Syktvykar	Russia
19	MSc	Lilit	Farsiyan	Russian-Armenian University	Yerevan	Armenia
20	Dr.	Sahitya Kumar	Avugadda	Italian Institute of Technology	Genova	Italy
21	MSc	Lutfi Aditya	Hasnowo	National Nuclear Energy Agency of Indonesia	Sleman	Indonesia
22	MSc	Emmanouil	Kasotakis	Aristotle University of Thessaloniki	Thessaloniki	Greece
23	MSc	Pavel	Varlamov	ITMO University	St. Petersburg	Russia
24	PhD	Ecem	Tiryaki	University of Vigo	Vigo	Spain
25	MSc	Elena	Schmid		Geneva	Switzerland
26	MSc	Julia	Majcherkiewicz	University of Vigo	Vigo	Spain
27	MSc	Kirill	Sobolev	Immanuel Kant Baltic Federal University	Kaliningrad	Russia
28	BSc	Dimitrios	Trygoniaris	Aristotle University of Thessaloniki	Thessaloniki	Greece
29	MSc	Georgios	Petroglou	Aristotle University of Thessaloniki	Thessaloniki	Greece
30	PhD	Theopoula	Asimakidou	Aristotle University of Thessaloniki	Thessaloniki	Greece
31	Dr.	Eirini	Myrovali	Aristotle University of Thessaloniki	Thessaloniki	Greece
32	PhD	Gayane	Chilingaryan	IPR NAS	Ashtarak	Armenia
33	PhD	Anton	Golov	Syktvykar State University	Syktvykar	Russia
34	PhD	Harutyun	Gyulasaryan	IPR NAS	Ashtarak	Armenia
35	Dr.	Nerea	Iturrioz Rodríguez	Italian Institute of Technology	Genoa	Italy
36	BSc	Britta	Maib	University Duisburg-Essen	Duisburg	Germany
37	PhD	Nikolaos	Maniotis	Aristotle University of Thessaloniki	Thessaloniki	Greece
38	Dr.	Narek	Sisakyan	IPR NAS	Ashtarak	Armenia
39	Dr.	Vladimir	Vlasov	Syktvykar State University	Syktvykar	Russia
40	PhD	Zoi	Kalpaxidou	Italian Institute of Technology	Genoa	Italy
41	PhD	Tim	Salzmann	University Duisburg-Essen	Duisburg	Germany

MaNaCa, D4.3: Year 2 report on Events (Workshops, Summer Schools, Conferences)

42	MSc	Tamara Nastasia Titilola Ais	Odutola	Aristotle University of Thessaloniki	Thessaloniki	Greece
43	BSc	Lorents	Zouzi	Aristotle University of Thessaloniki	Thessaloniki	Greece
44	BSc	Marina	Chatzi	Aristotle University of Thessaloniki	Thessaloniki	Greece
45	BSc	Eleni	Petsali	Aristotle University of Thessaloniki	Thessaloniki	Greece
46	Prof.	George	Litsardakis	Aristotle University of Thessaloniki	Thessaloniki	Greece
47	BSc	Irene	Katsarou	Aristotle University of Thessaloniki	Thessaloniki	Greece
48	BSc	Ioannis	Loidis	Aristotle University of Thessaloniki	Thessaloniki	Greece
49	MSc	Nur	Maddeppungeng	Gadjah Mada University	Yogyakarta	Indonesia
50	BSc	Alifia Retnandari	Gunawan Putri	Gadjah Mada University	Yogyakarta	Indonesia
51	BSc	Erna	Juwita	Sykytykar State University	Sleman	Indonesia
52	BSc	Ratih	Lestari	Gadjah Mada University	Yogyakarta	Indonesia
53	MSc	Bhatara	Ayi Meata	Sultan Ageng Tirtayasa University	Serang	Indonesia
54	MSc	Vasiliki	Koutrouli	Aristotle University of Thessaloniki	Thessaloniki	Greece
55	BSc	Syafa	Afsari	Gadjah Mada University	Yogyakarta	Indonesia
56	MSc	Georgios	Natsiopoulos	Aristotle University of Thessaloniki	Thessaloniki	Greece
57	MSc	Giulia Eugenia Paola	Nucci	Italian Institute of Technology	Genoa	Italy
58	BSc	Adella	Shafa	Gadjah Mada University	Yogyakarta	Indonesia
59	BSc	Frederik	Steinkamp	University Duisburg-Essen	Duisburg	Germany
60	BSc	David	Kasian	Russian-Armenian University	Yerevan	Armenia
61	PhD	Ana Maria	Panaite	Italian Institute of Technology	Genoa	Italy
62	PhD	Anna	Elsukova	University of Linköping	Linköping	Sweden
63	MSc	Kyriaki	Kontou	Aristotle University of Thessaloniki	Thessaloniki	Greece
64	BSc	Mena-Alexander	Kräenbring	University Duisburg-Essen	Duisburg	Germany
65	BSc	Elisavet	Papadopoulou	University Duisburg-Essen	Duisburg	Germany
66	Dr.	Ulf	Wiedwald	University Duisburg-Essen	Duisburg	Germany
67	BSc	Ni'matil	Mabarroh	Gadjah Mada University	Yogyakarta	Indonesia
68	Dr.	Iuliiia	Novoselova	Heinrich-Heine University Düsseldorf	Düsseldorf	Germany
69	Dr.	Hanna	Pazniak	University Duisburg-Essen	Duisburg	Germany
70	BSc	Rivaldo Marsel	Tumbelaka	Gadjah Mada University	Yogyakarta	Indonesia
71	Dr.	Konstantinos	Simeonidis	University Duisburg-Essen	Duisburg	Germany
72	MSc	Aikaterini-Rafailia	Tsiapla	Aristotle University of Thessaloniki	Thessaloniki	Greece
73	BSc	Milan	Tsompanoglou	Aristotle University of Thessaloniki	Thessaloniki	Greece
74	Prof.	Galina	Kuryandskaya	University of the Basque Country	Leioa	Spain
75	MSc	Zeinab	Abdulhadi	Le Mans University	Le Mans	France
76	MSc	Nurul Imani	Istiqomah	Gadjah Mada University	Yogyakarta	Indonesia
77	PhD	Areg	Kocharyan	Institute of Physical Research	Yerevan	Armenia
78	PhD	Papadopoulos	Kyryllos	Aristotle University of Thessaloniki	Thessaloniki	Greece
79	Prof.	Leonid	Kotov	Sykytykar State University	Sykytykar	Russia
80	PhD	Pavel	Makarov	Sykytykar State University	Sykytykar	Russia
81	PhD	Dmitriy	Pleshev	Pitirim Sorokin Sykytykar State University	Sykytykar	Russia
82	MSc	Rafailia	Rountou	Aristotle University of Thessaloniki	Thessaloniki	Greece
83	Dr.	Andrei	Rogalev	European Synchrotron Radiation Facility	Grenoble	France
84	Dr.	Verónica	Salgueiriño	University of Vigo	Vigo	Spain
85	MSc	Vladimir	Shaporov	Sykytykar State University	Sykytykar	Russia
86	BSc	Erna	Juwita	Gadjah Mada University	Yogyakarta	Indonesia
87	PhD	John Santigie	Conteh	Italian Institute of Technology	Genoa	Italy

MaNaCa, D4.3: Year 2 report on Events (Workshops, Summer Schools, Conferences)

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89	Dr.	Anna	Semisalova	University Duisburg-Essen	Duisburg	Germany
90	Dr.	Ralf	Meckenstock	University Duisburg-Essen	Duisburg	Germany
91	Dr.	Thomas	Feggeler	Lawrence Berkeley National Laboratory	California	United States
92	Prof.	Maxim	Abakumov	Pirogov Medical University	Moscow	Russia
93	Dr.	Maria	Efremova	Technical University of Munich	Munich	Germany
94	Dr.	Alexey	Nikitin	Pirogov Medical University	Moscow	Russia
95	PhD	Yuliya	Alekhina	Lomonosov Moscow State University	Moscow	Russia
96	Prof.	Hamid	Kachkachi	University of Perpignan	Perpignan	France
97	Dr.	Sara	Laureti	Nanostructured Magnetic Materials Lab	Rom	Italy
98	Dr.	Vasily	Temnov	Le Mans University	Le Mans	France

Annex 2

List of Participants the 4th Training Workshop (21-22 September 2021)

	Title	First name	Last name	Affiliation	City,	Country
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2	Dr	Tsiapla	Aikaterini-Rafailia	Aristotle University of Thessaloniki	Katerini	Greece
3	Prof.	Alexander	Akulshin	Swinburne University of Technology	Melbourne	Australia
4	Mr.	Artur	Aleksanyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
5	Ms.	Maia	Ambokadze	Georgian Technical University	Tbilisi	Georgia
6	Prof	Makis	Angelakeris	Aristotle University of Thessaloniki	Katerini	Greece
7	Dr.	Vladimir	Arakelyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
8	Dr	Tigran	Arzumanyan	NAS RA	Yerevan	Armenia
9	Prof.	Marcis	Auzinsh	University of Latvia	Riga	Latvia
10	Prof	Leon	Avakyan	Southern Federal University	Rostov on Don	Russia
11	Dr.	Nikolay	Avtandilyan	Yerevan State University	Yerevan	Armenia
12	Dr.	Rafik	Balasyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
13	Dr.	Denis	Brazhnikov	Institute of Laser Physics SB RAS	Novosibirsk	Russia
14	Mr.	Boris	Bryantsev	Lomonosov Moscow State University	Moscow	Russia
15	Dr.	Tatyana	Butaeva	Institute for Physical Research of NAS RA	Ashtarak	Armenia
16	Ms	Gayane	Chilingaryan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
17	Prof.	Archil	Chirakadze	Georgian Technical University	Tbilisi	Georgia
18	Dr.	Ratibor	Chumakov	Kurchatov Institute	Moscow	Russia
19	Ms	Evgenia	Dedousi	Aristotle University of Thessaloniki	Katerini	Greece
20	Dr.	Rafael	Drampyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
21	Prof.	Alfred	Gazazyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
22	Dr.	Emil	Gazazyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
23	Mr	Pefanis	Gerasimos	Aristotle University of Thessaloniki	Katerini	Greece
24	Dr.	Mariam	Gevorgyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
25	Ms	Armine	Ginoyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
26	Ms.	Astghik	Ghazaryan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
27	Dr.	Anahit	Gogyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
28	Dr.	Gayane	Grigoryan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
29	Ms.	Irina	Grigoryan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
30	Mr	Harutyun	Gyulasaryan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
31	Dr.	Grigor	Gyulkhandaryan	Institute of Biochemistry of the NAS RA	Yerevan	Armenia
32	Mr.	Eduard	Hakobyan	Russian-Armenian University	Yerevan	Armenia
33	Dr.	Sergey	Harutyunyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
34	Dr.	David	Hayrapetyan	Russian-Armenian University	Yerevan	Armenia
35	Dr.	Levon B.	Hovakimian	Institute of Radiophysics and Electronics	Ashtarak	Armenia
36	Dr.	Ashkhen	Hovhannisyan	Russian-Armenian University	Yerevan	Armenia

MaNaCa, D4.3: Year 2 report on Events (Workshops, Summer Schools, Conferences)

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39	Prof.	Aleksey	Kalinovich	Lomonosov Moscow State University	Moscow	Russia
40	Dr.	Davit	Khachatryan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
41	Dr.	Emmanuel	Klinger	Johannes Gutenberg Universität	Mainz	Germany
42	Mr.	Areg	Kocharyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
43	Prof.	Edvard	Kokanyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
44	Ms	Kazeki	Konstantina	Aristotle University of Thessaloniki	Katerini	Greece
45	Ms.	Kyriaki	Kontou	Aristotle University of Thessaloniki	Katerini	Greece
46	Prof.	Radik	Kostanyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
47	Dr.	Armen	Kuzanyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
48	Dr.	Astghik	Kuzanyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
49	Prof.	Claude	Leroy	Laboratoire ICB UMR CNRS	Dijon	France
50	Dr	Antonios	Makridis	Aristotle University of Thessaloniki	Katerini	Greece
51	Dr	Nikolaos	Maniotis	Aristotle University of Thessaloniki	Katerini	Greece
52	Mr.	Grigor	Mantashyan	Russian-Armenian University	Yerevan	Armenia
53	Dr.	Paytsar	Mantashyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
54	Dr	Aram	Manukyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
55	Prof.	Emilio	Mariotti	USiena	Siena	Italy
56	Prof	Karen	Martirosyan	University of Texas Rio Grande Valley	Texas	USA
57	Ms	Anastasia	Metallinou	Aristotle University of Thessaloniki	Katerini	Greece
58	Ms.	Lusine	Mheryan	Russian-Armenian University	Yerevan	Armenia
59	Ms.	Nune	Mkhitaryajn	Institute for Physical Research of NAS RA	Ashtarak	Armenia
60	Ms.	Lusine	Mkrtchyan	Institute of Biochemistry of NAS RA	Yerevan	Armenia
61	Mr.	Mher	Mkrtchyan	Russian-Armenian University	Yerevan	Armenia
62	Mr.	Rodolphe	Momier	Laboratoire ICB UMR CNRS	Dijon	France
63	Ms.	Marina	Movsisyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
64	Prof.	Atom	Muradyan	Yerevan State University	Yerevan	Armenia
65	Dr.	Pavel	Muzhikyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
66	Dr	Eirini	Myrovali	Aristotle University of Thessaloniki	Katerini	Greece
67	Mr	Georgios	Natsiopoulos	Aristotle University of Thessaloniki	Katerini	Greece
68	Ms	Tamara	Odutola	Aristotle University of Thessaloniki	Katerini	Greece
69	Ms.	Dace	Osite	University of Latvia	Riga	Latvia
70	Mr	Kyrillos	Papadopoulos	Aristotle University of Thessaloniki	Katerini	Greece
71	Ms	Elisavet	Papadopoulou	University of Duisburg-Essen	Duisburg	Germany
72	Prof.	Aram	Papoyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
73	Ms.	Svetlana	Pashayan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
74	Dr.	Mushegh	Rafayelyan	Yerevan State University	Yerevan	Armenia
75	Prof.	Aram	Saharian	Yerevan State University	Yerevan	Armenia
76	Dr.	Armen	Sargsyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
77	Prof.	David	Sarkisyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
78	Prof.	Hayk	Sarkisyan	Russian-Armenian University	Yerevan	Armenia

MaNaCa, D4.3: Year 2 report on Events (Workshops, Summer Schools, Conferences)

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80	Dr.	Svetlana	Shmavonyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
81	Mr.	Narek	Sisakyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
82	Dr	Marina	Spasova	University of Duisburg-Essen	Duisburg	Germany
83	Mr	Nikolaos	Tetos	Aristotle University of Thessaloniki	Katerini	Greece
84	Mr.	Arman	Tigranyan	Yerevan State University	Yerevan	Armenia
85	Dr.	Ara	Tonoyan	Institute for Physical Research of NAS RA	Ashtarak	Armenia
86	Mr	Milan	Tsompanoglou	Aristotle University of Thessaloniki	Katerini	Greece
87	Prof.	Tigran	Vartanyan	ITMO	Saint-Petersburg	Russia
88	Prof	Ulf	Wiedwald	University of Duisburg-Essen	Duisburg	Germany
89	Ms.	Anna	Zakoyan	Institute of Biochemistry after H. Buniatyan	Yerevan	Armenia