

Research Agreement

Between

The Italian National Institute for Research in Nuclear Physics (Istituto Nazionale di Fisica Nucleare in the following INFN), National Laboratories of Frascati (in the following LNF) tax code 84001850589, VAT number. 04430461006, headquarters in Enrico Fermi street, n. 40, Frascati (Rome): the Director of Frascati National Laboratories, pursuant to article number 14 of INFN Technology Transfer regulation, is authorised to sign for INFN

And

the privately-held research and development firm Omega-P R&D, Inc. (hereafter Omega-P) whose address is Suite 401, 291 Whitney Avenue, New Haven, CT 06511 (USA).

Hereinafter each individually referred to as a “Party” and collectively as the “Parties”.

CONSIDERING:

the National Institute for Nuclear Physics (INFN) is the Italian research agency dedicated to the study of the fundamental constituents of matter and the laws that govern them, under the supervision of the Ministry of Education, Universities and Research (MIUR). LNF is the first and the largest among INFN laboratories, with large experience in particle accelerator Physics. INFN conducts theoretical and experimental research in the fields of subnuclear, nuclear and astroparticle physics. Fundamental research in these areas requires the use of cutting-edge technology and instruments, developed by the INFN at its own laboratories and in collaboration with industries.

The Parties each have scientific expertise in the area of free-electron laser (FEL) technology.

INFN, already carries on the Scientific Research activity named CompactLight XLS, that is intended to extend the wavelength range for a free-electron laser (FEL) light source further into the x-ray region than other FELs.

Omega-P has expertise in three technology areas that are crucial to reach CompactLight XLS goal. These are: (a) the radio frequency (RF) source itself; (b) the RF pulse compressor; and (c) the low-loss RF power transmission waveguide that would convey RF power from the source and pulse compressor to the linear accelerator (linac).

The Collaboration is established in recognition of the fact that LNF and Omega-P have a common interest in the development of the technical design tools necessary for realization of a high-power Ka-band RF system to drive a portion of the linac that is contemplated for the future European light source CompactLight, and possibly for other related projects. LNF expects to be responsible for developing a third-harmonic portion of the CompactLight linac, while Omega-P has accumulated knowledge, design tools, and equipment over its more than two decades of research and development towards a millimeter-wave high-energy linac, a significant portion of which may be directly relevant to help support LNF's research efforts.

The goal of extending further into the x-ray region the wavelength range for a FEL light source can be accomplished through use of an X-band (12 GHz¹) linac structure, as compared with S- and C-band (3 and 6 GHz) linacs used elsewhere. But, in addition, the 12-GHz CompactLight linac is to employ a section operating at the third harmonic (36 GHz) that will be phase-synchronized with the 12 GHz power. This strategy aims to linearize the longitudinal phase-space in order to increase the beam brightness.

Omega-P scientists that will participate in The Collaboration have previously worked and are currently working at both Yale University and at Omega-P on these and related topics.

The Parties have therefore interest in collaborating in the terms and conditions established in this Agreement.

Art. 1 Definitions

Inside the Agreement, whenever used in capital letters stands the following definition for:

“Research Activity”: the scientific activity made by the Parts in consideration of this Agreement;

“Intangible Asset”: inventions, know-how, industrial drawings and engineering designs, secret information, computer software, database, trademarks, and every other result of Research Activity that can provide economic business;

¹ The frequency values stated (12 and 36 GHz, etc.) are approximate values, and not to be taken as at all restrictive on the frequency range to be investigated within The Collaboration.

“Know-How”: closely held information, not easily available to the general public, in the form of unpatented inventions, formulae, designs, drawings, procedures and methods, together with accumulated skills and experience coming from Research, needed for scientific, technological, industrial or commercial activity;

“Background”: the Intangible Assets completely or partially owned by one Part before the collaboration under this Agreement;

“Sideground”: the Intangible Assets realised or in any case obtained by each Party during the period of this Scientific Collaboration but not directly connected to the activities agreed for the Scientific Collaboration itself, even if they relate to the same technical-scientific field;

“Foreground”: the Intangible Assets made or in any case achieved in the execution of this Scientific Collaboration and because of it;

“Confidential Information”: any information or data that one Party communicates to the other and that at the time of the communication are expressly qualified as “confidential”, or that, if communicated verbally are qualified in writing as “confidential” in the following 15 days.

“Funding Agency”: is any public or private institution that provides financial support for research and development as described in this memorandum, and which provides barriers to dissemination or unauthorized use of proprietary materials, when this proprietary material is so identified by the Parties.

Art. 2 Objectives

1. The purpose of The Collaboration is to exchange research information and personnel on issues regarding 36-GHz RF sources, RF pulse compressors, and low-loss RF transmission waveguide. As part of this exchange, LNF and Omega-P scientists will exchange ideas and results on simulation studies and design concepts

for these three categories of 36-GHz technology. These exchanges can be via electronic media (e-mail, skype, etc.), via written hard-copy reports, and via individual visits to one-another's facilities. A future objective, to be formalized after CompactLight enters its R&D (or CD-zero) phase, is for LNF scientists to participate in jointly-designed experimental studies at what is expected to be a Ka-band test facility to be moved in 2020 from Yale University (where it has evolved and operated during the past two decades) to a facility being sought which might be established at Brookhaven National Laboratory in Upton, NY on Long Island. Examples of existing Omega-P equipment and instrumentation that could be part of this facility are shown in the Attachment, for future reference and to illustrate the nature of the Ka-band technology to be developed under The Collaboration.

Art. 3 Scientific Coordinators

1. The Parties shall each nominate a Scientific Coordinator whose role shall be to coordinate the activities related to the performance of the Project tasks covered by this Agreement. The Scientific Coordinators shall also act as Safety Correspondents and be responsible for safety matters.

The Scientific Coordinators shall:

- a. check every phase of the Project;
- b. support the communication between the Parties;
- c. keep periodic report on the Project development;
- d. preserve the secrecy of confidential information;
- e. be responsible for occupational safety and health matters

The Scientific Coordinators and Safety Correspondents shall be for INFN Dr. Massimo FERRARIO and for Omega-P, Dr. Jay L. HIRSHFIELD,
Or such successor as each Party may designate.

Art. 4 Description of the Cooperation

Cooperation between the parties to the Collaboration can be as:

- a. exchange of personnel;
- b. exchange of equipment, once CompactLight enters its R&D phase;
- c. exchange of research results, data, and technical know-how; and
- d. any other form which the parties might consider appropriate, and which are mutually acceptable

Details of the individual activities pursued within the boundaries of this Agreement will be documented as "Technical Annex" agreements between the respective participating Parties. At a minimum these Annexes shall contain details concerning the object of the specific cooperation, time schedules, technical, financial, and scientific responsibilities. If not specifically agreed-upon otherwise the general rules of this Agreement shall apply.

Art. 5 Personnel and Equipment

The Parties will delegate personnel to the other Parties to the extent agreed upon. Each delegation requires the consent of the receiving Party. The delegates will remain full employees of their home Institutions. The receiving Party will not be responsible for social insurance (covering pension fund, unemployment, occupational injury or disease). The sending Party is responsible for maintaining adequate health insurance and third party liability insurance coverage of the delegates unless the receiving Party agrees to take responsibility for providing appropriate insurance. The costs of each delegation, including salaries and travel costs, shall be borne by the delegating Party unless it is specifically otherwise agreed.

The receiving Party will provide assistance in finding adequate housing for the delegates.

While at the receiving Party's facility, the delegates are subject to the safety, business and other rules of the receiving Party.

The term "receiving Party's facility" as employed here applies only to a facility of the Parties to this agreement, and not to other facilities affiliated in any way with either party, such as Yale University or Brookhaven National Laboratory in the case of Omega-P or the other Laboratories or Divisions in the case of INFN.

Equipment sent by one Party to another Party for the purpose of this collaboration will remain the property of the sending Party unless otherwise agreed. Cost of transportation will, unless agreed otherwise, be borne by the sending Party. The receiving Party will act as importer and take care of all formalities, including customs, import excise tax, etc. However, no equipment exchanges are contemplated in The Collaboration until after CompactLight enters its R&D phase.

Art. 6 Effective date and Duration

This Agreement shall become effective on the later date of signature of the Parties.

It will remain in effect until superseded or until five years from the effective date, whichever occurs first it can be extended by mutual consent. Any Party may withdraw at any time upon sixty days' notice to the other Party.

Once a task is initiated, it is the intention of the parties to complete the effort.

Therefore, in the event of termination of this Agreement by any Party, its provisions shall continue to apply for any project begun under this Agreement until the completion or termination of such project.

Art. 7 – Intellectual Property: Background and Sideground

Each Party is and remains the exclusive owner of its own Background. As needed and appropriate under the circumstances the Parties will make available to each other free of charge and without being asked for in writing or in any other specific form, their existing scientific information, research results and data, protected or not, relevant for the purposes of the Collaboration. They will not hold each other liable for exactness or completeness of information which they transmit according to their best knowledge.

It is specifically indicated in the technical Annex the Background held by the Parties and made available to the other Party for the sole purpose of carrying out the Research Activity.

The Parties are also the exclusive owners of the Sideground, developed independently in carrying out the activities covered by this Agreement, the use of which may be granted to the other Party through a specific written agreement.

In the context of the Collaboration, each Party shall be entitled to use for its own purposes any acquired knowledge or expertise, whether patentable or not.

All data obtained will be made accessible to both Parties.

Art. 8 Intellectual Property: Foreground

The Parties are co-owners of the jointly generated Foreground during the Research Activity. The shares of ownership of intellectual property rights will be established from time to time with a specific written agreement, taking into account the actual contribution given by each Party and / or their inventors.

The Parties give prompt communication of the achievement of Foreground.

If a patentable invention is developed by one Party in the context of the Collaboration, the other Party shall be informed thereof as soon as possible in order

to decide on the appropriate ownership, before further steps are taken; it is understood that every Party shall be entitled to a free utilization. Joint inventions shall belong jointly to the inventing parties who have to agree in each case on the sharing and the joint exploitation. Pending such decision, the parties shall refrain from action that would prejudice patent-taking or licensing.

The inventors who achieved the invention must be recognized as authors in the patent applications.

The Parties are expressly forbidden to exploit the Foreground in a regime of secrecy.

Art. 9 Publications

The publications must not affect both the intellectual property of the owners and the confidentiality obligations.

The results of each collaborative task should be reported to the Collaboration for critical review before outside announcements are made. Results to be presented for publication in the name of the Collaboration should be submitted for publication only after critical review and agreement between the members of the Collaboration task. All members of the Collaboration are entitled to be involved in the publication of results obtained within the Collaboration.

Art. 10– Confidentiality

Each Party expressly undertakes, for itself and for its employees and / or collaborators, to preserve the confidentiality of sensitive information exchanged during the performance of the activity covered by this Agreement and therefore not disclose any sensitive information outside the Collaboration, for the entire duration of this Agreement and for a period of 5 (five) years following the natural expiry or the anticipated termination, however determined, of the same. An exception to this

Article can be allowed when sensitive information needs to be disclosed by one or both Parties in research proposals for support by Funding Agencies. However, such disclosures by a single party must be approved in advance by the other Party, and in any case will be identified as proprietary in any written or oral proposals to Funding Agencies. [See definition of “Funding Agency” in Article 1.]

Art. 11 Occupational safety and insurance

Each Party covers at its own expense its own personnel involved in the execution of this Agreement, with insurance policies against the risk of accidents and guarantees compliance with current legislation on protection and safety in the workplace.

Art.12 Withdrawal from the Agreement

Each Party has the right to withdraw from the Agreement at any time upon sixty days’ notice to the other Party; the communication shall be through email. In this case the withdrawing Party will have to reimburse the other Party the expenses incurred and keep it free from the commitments and / or obligations assumed up to the date of receipt of the withdrawal notice.

The confidentiality of sensitive information must be respected by both Parties for 5 years from the date of withdrawal.

Art. 13 Funding

Activities under this Agreement, including the provision of financial support are subject to applicable national laws and regulations and shall be subject to the availability of appropriated funds.

Art. 14 Liability

The Parties in the framework of this agreement will not hold each other liable for

damage caused by their personnel delegated to the other Party, unless such damage is caused by gross negligence or willful misconduct. Liability for damage suffered by delegated personnel or third parties within the Collaboration is defined by applicable law.

Art. 15 Disagreement

The Parties shall, in the framework of this Agreement, do their utmost to settle amicably any differences and difficulties which may arise out of this Agreement should be referred to the appropriate Director for joint resolution.

Art. 16 Obligation

This Agreement is to define a collaboration, which does not constitute a contractual obligation on the part of any of the Parties.

Art. 17 Amendments

This Agreement may be modified from time to time by different written agreements of the parties.

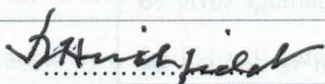
Art. 18 Concurrence

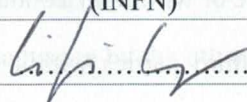
The following representatives of LNF and Omega-P concur in the terms of this Agreement.

Thus drawn up in two copies in the English language and signed by the authorized representatives of the Parties.

The Omega-P R&D, Inc

The Istituto Nazionale di Fisica Nucleare



(INFN)


Doctor Jay L. HIRSHFIELD

Doctor Pierluigi CAMPANA

President and Scientific Director

Director

On: 18 November.....2019

On: 21 OTT. 2019.....2019

LABORATORI NAZIONALI DI FRASCATI DELL'INFN

IL DIRETTORE

Dott. Pierluigi Campa