

Promovarea proiectului Dr. Laser în Pavilionul României la World Expo Osaka 2025

Realizarea broșurii bilingve engleză-japoneză și distribuirea la stand, participarea la evenimentele prilejuite de Ziua Drapelului României la Expo Osaka 2025 (26 iunie 2025)

(v. Eveniment TVRI - Ziua României la EXPO Osaka 2025 <https://www.youtube.com/watch?v=49s0rr8hUqE>)



  **Dr. LASER** 

MEDICAL APPLICATIONS OF HIGH-POWER LASERS

高出力レーザーの医療応用アプリケーション

PARTNERSHIP FOR HEALTH

健康のためのパートナーシップ

 **Cofinanțat de Uniunea Europeană**  





Pe urmele Luminii Extreme. Povestea ELI-NP la Osaka.

<https://www.research.gov.ro/comunicare-mass-media/revista-inhouse/#>

Din prezentarea d-lui Călin Alexandru Ur de Ziua Drapelului României (26 iunie 2025):

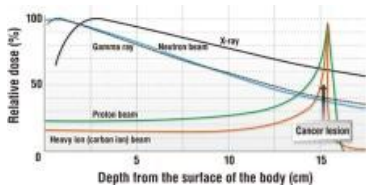
Laser-driven medical applications



Project Dr. LASER—Included in the Romanian Health Program

- 35 MEUR for 5 years—Co-funded by EU and Romanian Government

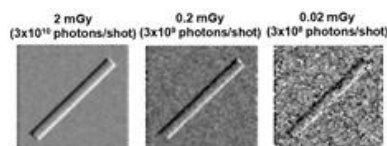
Laser-driven C-ions for hadron therapy



- **10 PW-class lasers can accelerate heavy-ions to therapeutic energy and dose, at ultrahigh dose rate**
- laser-driven ultra-high dose rate heavy-ion irradiation (10^{10} Gy/s) can enable **the FLASH effect** of sparing healthy tissue during treatment



Phase contrast X-ray imaging

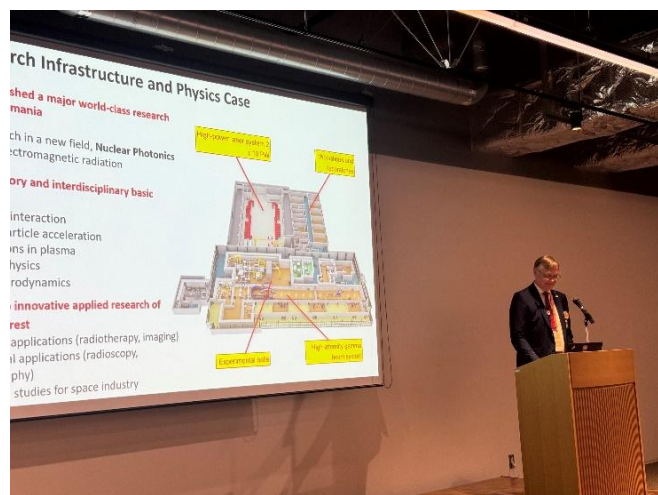


- **High-sensitivity and low dose phase-contrast X-ray imaging for soft tissue tumors**
- Method requires intense, directional, short-pulse and spatially coherent X-ray source: **100 TW class lasers can do this**



Medical radioisotopes production

- **High power lasers offer the possibility for producing medical radioisotopes due to their ability to accelerate different types of particles**
- **"on-site" production of medically important short-lived radioisotopes, such as ^{11}C , ^{13}N or ^{15}O becomes feasible with lasers**
- **100 TW-class high repetition rate laser sufficient for radioisotope production**



Broșura de prezentare bilingvă (engleză-japoneză) a proiectului Dr. Laser

distribuită la standul ELI-NP (4-28 iunie 2025)



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High-power laser medical applications: Dr. LASER | 高出力レーザーの医療応用アプリケーション

PARTNERS

- "Carol Davila" University of Medicine and Pharmacy in Bucharest
- Regional Institute of Oncology Iasi
- Oncology Institute "Prof. Dr. Ion Chiricuță" Cluj-Napoca
- National University of Science and Technology Politehnica Bucharest
- ACCENT PRO 2000
- IP Automatic Design (IPAD)

パートナー

ブカレストの「キャロル・ダビラ」医科薬科大学
ヤシ地域腫瘍研究所
「イオン・チリクシュ」博士教授「クルージュ・ナポカ腫瘍学研究所」
ブカレスト工科大学
アクセントプロ2000
IP自動設計 (IPAD)

Description

increasing the population's access to advanced cancer treatment and diagnosis, as well as developing new medical treatments, can bring major benefits to both the health sector and the economy of Romania. The project aims to use and further develop research and development capabilities in the field of cancer control, with the goal of obtaining innovative, minimally invasive therapeutic and diagnostic solutions.

The "Medical Applications of High-Power Lasers - Dr. LASER" project addresses two major needs in the treatment and diagnosis of cancer in Romania: increasing public access to new advanced methods (processes) of cancer treatment and diagnosis by reducing the implementation costs of these methods, as well as improving them to maximize patient benefits.

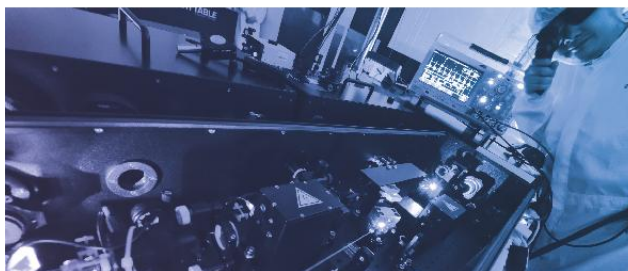
The specific processes targeted within the Dr. LASER project include treatment through heavy ion hadron therapy assisted by phase-contrast X-ray imaging diagnostics, as well as diagnosis and treatment using medical radioisotopes.

概要

先進的ながん治療・診断への適用の拡大、そして新しい治療法の開発は、ルーマニアの保健分野と経済への双方に大きな利益をもたらす可能性があります。本プロジェクトは、がん対策分野における研究開発能力の活用とさらなる発展を目指し、革新的で低侵襲な治療・診断ソリューションの実現を目指します。

「高出力レーザーの医療応用 - Dr. LASER」プロジェクトは、ルーマニアにおけるがん治療・診断に対する2つの主要な需要に応えます。導入コストの削減によって、がん治療・診断の新たな先進的方法（プロセス）へのパブリックアクセスを向上させること、そして患者の利益を最大化するためにこれらの方法を改善することを目指しています。

Dr. LASERプロジェクトで対象となる具体的なプロセスには、位相コントラストX線画像診断を活用した重イオンハドロン療法による治療、および医療用放射性同位元素を用いた診断・治療が含まれます。



The general objective of the project is to conduct research, innovation, development, and pilot testing necessary for creating new treatment and diagnostic methods based on high-power lasers, as well as to disseminate these advances to the medical community and the medical equipment industry for large-scale implementation (knowledge and technology transfer).

The main goal of the proposed project is to improve methods for cancer treatment and diagnosis.

The specific medical objectives of the research activities focus on breast cancer, whose mortality rate is significantly increasing in Romania and across Europe, as follows:

Obj1. Research into hadron therapy, specifically focusing on carbon ion (C-ion) therapy for an aggressive and radioresistant form of breast cancer, such as triple-negative breast cancer (TNBC);

Obj2. Research into imaging techniques dedicated to the detection and localization of breast tumors with improved sensitivity and accuracy; and with reduced radiation dose;

Obj3. Research into radiolotope generation, focusing on producing short-lived isotopes for monitoring tumor progression and treatment response through PET-CT (Positron Emission Tomography – Computed Tomography) techniques, such as ^{11}C or ^{62}Cu .

The new treatment and diagnostic methods developed within the Dr. LASER project have the potential to be extended, after the project's completion, to other types of cancer as well.

本プロジェクトの主要目的は、高出力レーザーを基盤とした新たな治療法・診断法の開発に必要な研究開発、技術革新、パイロットテストを実施し、これらの進歩を医療界および医療機器業界に普及させ、大規模導入（知識・技術移転）を図ることにあります。提案するプロジェクトの主な目標は、がんの治療および診断法の改善です。

研究活動の具体的な医療目標として、ルーマニアおよび欧州全域で死亡率の上昇が顕著な乳がんが焦点を当てており、以下の通りです。

目標1: ハドロン治療、特にトリプルネガティブ乳がん(TNBC)などの悪性度が高く放射線抵抗性のある乳がんに対する炭素イオン(Cイオン)治療に焦点を当てた研究。

目標2: 感度および精度の向上と放射線量の低減を両立させながら、乳がんの検出と位置特定に特化した画像技術の研究。

目標3: PET-CT (陽電子放出断層撮影法)を用いて腫瘍の進行と治療効果を監視するための、 ^{11}C や ^{62}Cu などの短寿命同位元素の生成に焦点を当てた放射性同位元素研究。

Dr. LASERプロジェクトで開発される新しい治療法と診断法は、プロジェクト完了後、他の種類のがんにも適用できる可能性があります。



Medical applications of high-power lasers - Dr. LASER
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