A KNOWLEDGE BASE FOR RESEARCH AND DEVELOPMENT – TRAINING AND COMMUNICATION

The core of ARCHADE's mission is to accelerate the development of hadrontherapy in Europe and serve as a partner for other regions of the world. Research and development are key elements of this mission. As a new and rapidly developing field, carbon ion hadrontherapy will require an important range of basic and applied research initiatives.

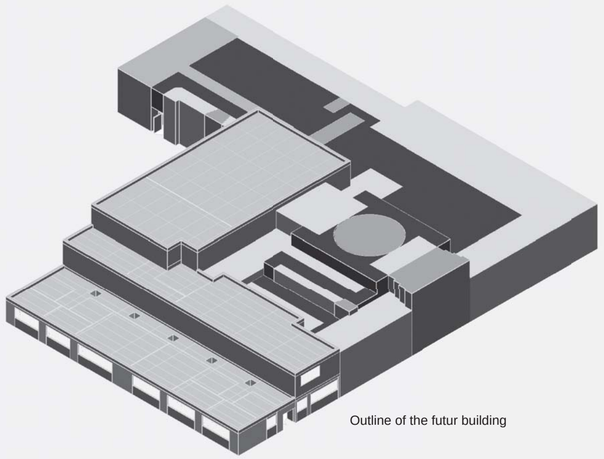
In cooperation with its partners, ARCHADE will carry out ambitious research programmes in fields such as medical physics, radiobiology, and medical imaging required for a better understanding and use of the carbon ion beams in cancer therapy. The latter will require technological development in the following areas :

- Particle Accelerators
- Dosimetry
- Beam lines and beam control
- Treatment planning systems (TPS)
- Biological effects of carbon ions

The Centre will not only serve as a research facility for its own team of dedicated researchers, but also provide technical support and cutting edge infrastructure for research teams from clinical centres and laboratories throughout Europe.

The Centre has an equally important role to play in disseminating information on the use of hadrontherapy and its benefit to their patients for health sector professionals. On a parallel track, ARCHADE will develop training programmes for a variety of audiences including : hadrontheapy staff and offer consultancy services and support for project initiators in this field.

ARCHADE will carry out its strategy and programmes in a manner that is consistent, in particular, with the French National Hadrontherapy Programme and in close collaboration with the french hadrontherapy centres: Institut Curie (Orsay), Centre Lacassagne (Nice), ETOILE (Lyon) and in synergy with the expanding network of european hadrontherapy centres.



Outline of the futur building

INDUSTRIAL SECTOR DEVELOPMENT

Through a strong programme of technology transfer and cooperation with industrial partners, ARCHADE intends to stimulate the creation of new businesses and the development of existing ones in the fast growing global health sector.

Through activities such as the business incubator and the ARCHADE Business Club, the Centre will have a leveraging effect and provide the necessary critical mass for business development through its network of partners. This dynamic will provide opportunities for european business in a number of different fields, including : particle accelerators, precision mechanics, robotics, medical imaging, dosimetry and information technology.

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CAEN SCIENTIFIC AND TECHNICAL RESEARCH PLATFORM

GANIL : Large National Heavy-Ion Accelerator
CYCERON : Centre for Cerebral Imaging and Research in the Neurosciences
L.P.C. : Nuclear Physics Laboratory
LARIA : Radiobiology Research Centre
CIMAP : Centre for Research on Ions, Materials and Photonics
GRECAN : Regional Cancer Research Group
ICORE : Biology Research Centre

ARCHADE Association

François Baclesse Comprehensive Cancer Centre
C.H.U. : Caen University Hospital
ENSICaen : Caen National Graduate School of Engineering
Caen University

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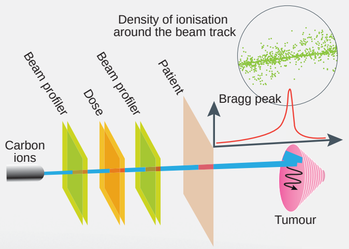
Archade
ADVANCED RESOURCE CENTRE
FOR HADRONTHERAPY IN EUROPE

ARCHADE is a European research and development centre exclusively dedicated to hadrontherapy. Hadrontherapy is a new form of radiotherapy, which is more precise and effective in treating certain types of cancer. This promising new technology is in full expansion in Europe and worldwide. As a result, there is an important need for technical, biological and clinical research in this field.

ARCHADE benefits from a network of leading scientific and clinical partners at both the regional and national level. Over time, these partners have developed distinctive expertise in areas well-suited to the field of hadrontherapy.

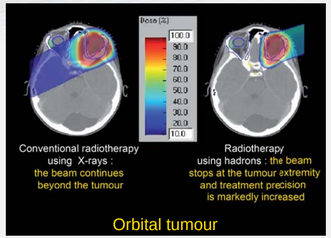
The ARCHADE Centre was founded in close partnership with IBA, the world leader in proton therapy, one modality of hadrontherapy. ARCHADE benefits, as well, from strong support from the Basse-Normandie Region, which anticipates growth in high technology research and economic activity from its investment in the Centre.



Schematic view of carbon ion treatment

Cancer in Europe and the advantages of hadrontherapy

In Europe, over 2,800,000 cases were diagnosed in 2002, with over 1,700,000 cancer deaths, making cancer the second most frequent cause of mortality in this region. The incidence of cancer is increasing annually throughout the world. If current trends continue, there will be a 50% rise between 2000 and 2020. The growing incidence of cancer-related mortality highlights the need to develop new and more effective therapeutic approaches for its treatment.



In this context, the advantages of hadrontherapy are clearly significant. It is a form of radiotherapy that uses particles from the hadron family, primarily protons and carbon ions, as opposed to conventional radiotherapy which uses X-rays. These two modalities provide more precise radiation dose delivery to the tumour, while reducing side effects on healthy surrounding tissues. Moreover, hadrontherapy with carbon ions enhances, in particular, the biological effectiveness of the treatment. Thus, hadrontherapy with carbon ions is increasingly recognised as one of the most promising solutions for improving the control of tumours resistant to classical radiotherapy.

Recent research indicates that between 10 - 15% of all patients treated by radiotherapy today could benefit from hadrontherapy with protons and at least 5% could benefit from hadrontherapy with carbon ions. There are several hadrontherapy projects in Europe. Some are under construction already and will begin operations within the next five years, ARCHADE is distinguished from the others by the fact that it is the only one fully dedicated to research. As such, it will play a key role in the development and implementation of this new technology in Europe.

Hadrontherapy centres worldwide : existing and under construction

USA - 9 centres
Japan - 8 centres
Germany - 5 centres
France - 2 centres
Italy - 1 centre
Switzerland - 1 centre
Taïwan - 1 centre
China - 1 centre
South Korea - 1 centre

Partnerships and support : the scientific and technical research platform in Caen, IBA and the Basse-Normandie region

ARCHADE's advantage derives from the quality of its exceptional founding partners : the centres of excellence that make up the Caen scientific and technical platform, the IBA Group, and the Basse-Normandie Region.

The Caen agglomeration encompasses an unparalleled ecosystem of scientific and medical institutions ideally suited for the development of hadrontherapy. Situated on the same campus are research centres in the fields of nuclear physics, radiobiology, medical imagery and neuroscience research. In addition, the Regional Cancer Centre and the University Hospital are in close proximity.

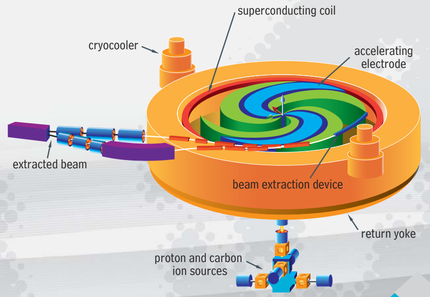
IBA, the world industrial leader in proton therapy, is headquartered in Belgium and listed on the pan-European stock exchange, EURONEXT. IBA has designed a superconducting cyclotron which will be the first cyclotron in the world capable of delivering both protons and carbon ions for therapeutic use. IBA will build the cyclotron in its factory in Louvain la Neuve and install it in Caen in the context of the ARCHADE project

Basse-Normandie, a forward looking Region, in dynamic evolution, invested in ARCHADE as part of its strategy to attract high-tech and value-added economic initiatives and research activities to reinforce the Region's growth potential.

A cyclotron, a research centre

In partnership with IBA, ARCHADE's development is being undertaken in two distinct phases. The first phase has five components :

- Construction of the new superconducting cyclotron
- Construction of the accelerator building and research centre
- Launch of a physics and radiobiology research programme to support medical application of the cyclotron
- Qualification of the cyclotron for therapeutic use
- Development of potential industrial applications and partnerships with the business sector

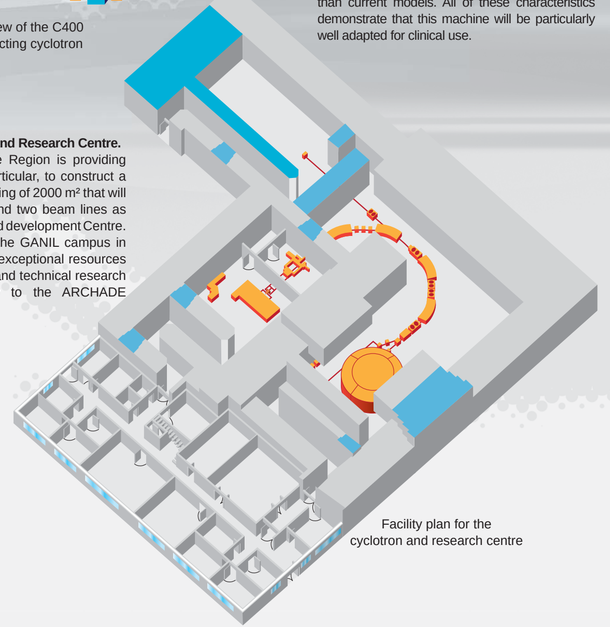


Engineer view of the C400
superconducting cyclotron

During the second phase, ARCHADE's research activity will be extended to cover the clinical use of carbon ions, working in close cooperation with laboratories and clinical centres throughout Europe. At the same time, ARCHADE will develop a range of consulting and training services for hadrontherapy centres.

Cyclotron
IBA is investing 40 million euros for the construction of the new superconducting cyclotron prototype to qualify the machine for therapeutic use by 2012. This six meters diameter accelerator will be four times smaller, less expensive and simpler than the current synchrotron-based model. Another attractive feature is that energy consumption for this cyclotron will be approximately three times less than current models. All of these characteristics demonstrate that this machine will be particularly well adapted for clinical use.

Accelerator Building and Research Centre.
The Basse-Normandie Region is providing 13 million euros in particular, to construct a custom-designed building of 2000 m² that will house the cyclotron and two beam lines as well as the research and development Centre. It will be situated on the GANIL campus in close proximity to the exceptional resources of the Caen scientific and technical research platform and nearby to the ARCHADE business incubator.



Facility plan for the
cyclotron and research centre