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Few recollections from Gerardo's time in Milano

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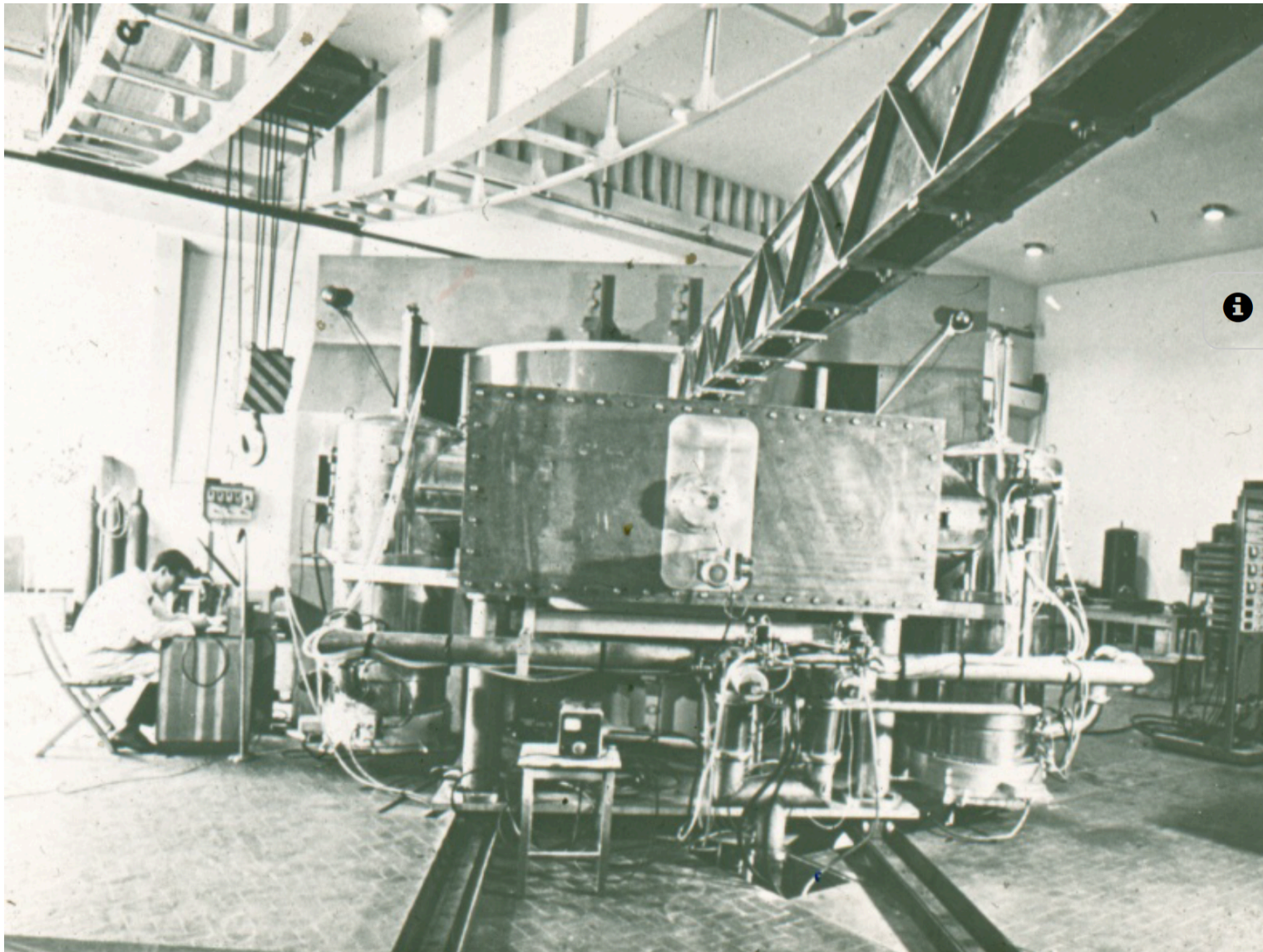




this project was an exemplary case of success due to the synergy between developments in fundamental research and technological developments dictated by research in industry.

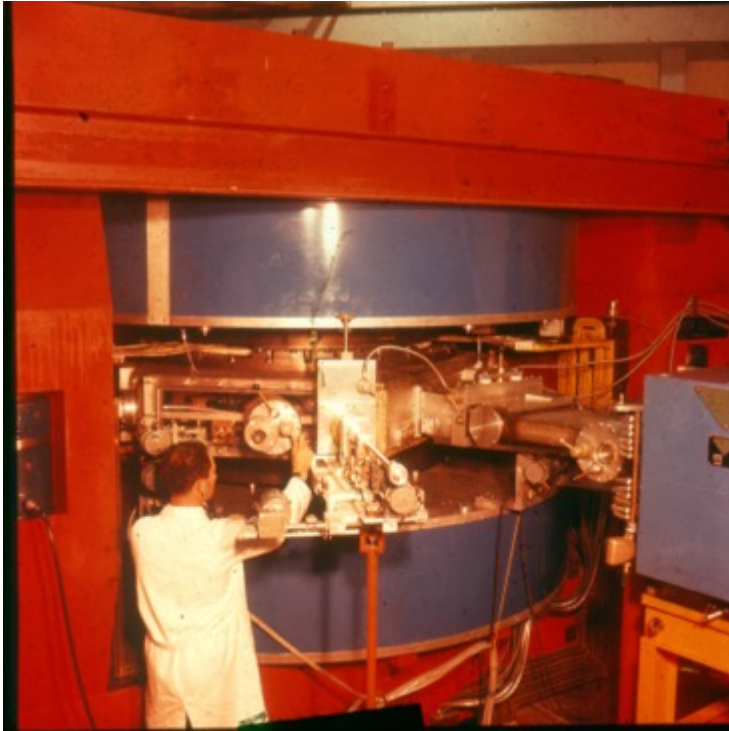
(for example those for cables and windings by Pirelli).

Transport of the copper cable for winding the coils of the first cyclotron in Milan in the early 1960s.



Un apposito capannone ed altri edifici furono costruiti per ospitare la macchina e i laboratori di ricerca e alla direzione del progetto ci furono Tagliaferri, Succi e Resmini.

These scientists were the mentors of
Gerardo Dutto



Gerardo made a significant contribution to this cyclotron

and to him, for example, we owe the design of a valve on the beam extraction channel that has always been called the "**Dutto valve**"

(as a student I have learned about it before meeting him)

a story very similar to the «Dutto Plates» for vertical centering of the first few turns of the beam at TRIUMF Center Region Cyclotron, a 3 MeV full sized prototype of the main cyclotron center region

Initial Operation of the Milan AVF Cyclotron.

E. ACERBI, M. CASTIGLIONI, G. DUTTO, M. FOIS, A. LUCCIO,
F. RESMINI, G. STRINI, C. SUCCI and G. TAGLIAFERRI

Istituto di Scienze Fisiche dell'Università - Milano
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(ricevuto il 28 Gennaio 1965)



**First AVF cyclotron in Europe,
2nd in the world
Built by Succi, Resmini,
Acerbi et al.**

To save money they :

Are not using trimming coils (it works)

**Frequency fixed at 20510 kHz
→ only protons**

Beam only in the night (not radiation shields)

**Electrostatic extractor not used
Negative H⁻ ions are accelerated up to a radius**

where is positioned an aluminum foil → H⁺

H⁺ are switched off by the magnetic field

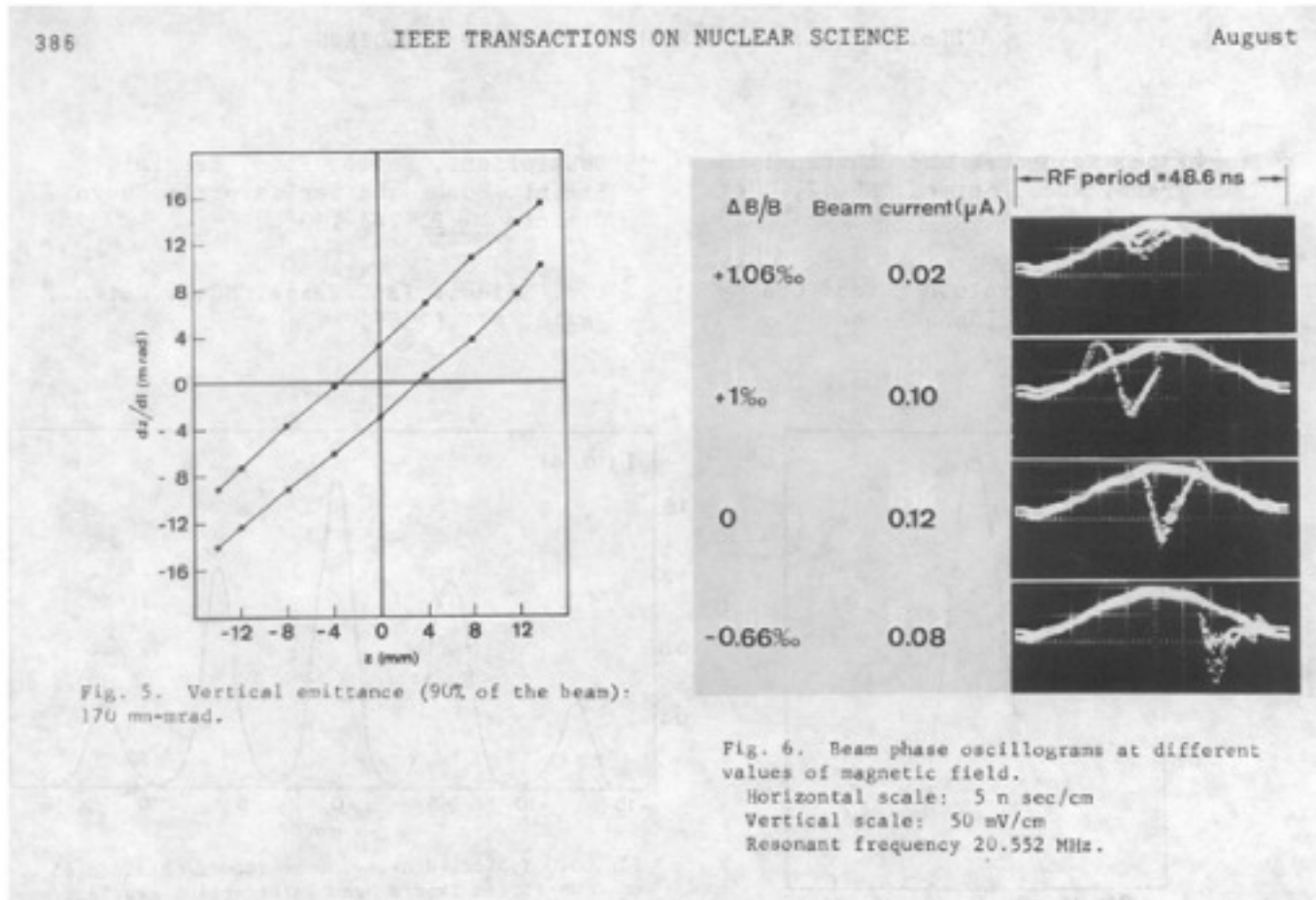
Proton beams of the Milan cyclotron

- **Easy extraction (efficiency of the 100%).**
- **Proton energy, fixed by the position of the stripping foil: $E_p = 14 \rightarrow 44$ MeV.**
- **An energy change takes few minutes.**
- **With magnetic analysis $\Delta E_p \rightarrow 20$ keV**
- **Good beams for excitation functions**
- **14 \rightarrow 44 MeV energy range of interest for the onset of different reaction mechanisms.**

ACCELERATION OF H^- IONS AND EXTRACTED BEAM MEASUREMENTS
IN THE MILAN CYCLOTRON (+)

E. Acerbi, M. Castiglioni, G. Dutto, F. Resmini, G. Strini, C. Succi
and G. Tagliaferri

University of Milan, Milan, Italy
and
Istituto Nazionale di Fisica Nucleare - Sezione di Milano



From 1965 to 1970 there

are a number of scientific

contributions to

Congresses by the Ciclotron group of
Milan

with the presence of Gerardo Dutto.

Operational Experience with the H- Beam of the Milan Cyclotron

(E. Acerbi, C. Birattari, M. Castiglioni, G. Dutto, G. Fait, G. Strini, C. Succi)

International Conference on Cyclotrons - Oford.

Butterworths and Company Publishers Ltd London 1969

Electron - Capture Cross - Section in Various Gases by Protons with Energies from 25 to 38 MeV

(E. Acerbi, B. Candoni, M. Castiglioni, G. Dutto, G. Fait, F. Resmini, C. Succi)

Il Nuovo Cimento Vol. 64 1969

Stabilizzazione delle derive rapide della tensione acceleratore del ciclotrone di Milano

(G. Strini, C. Succi)

INFN/ TC - 70/3 1970

Scattering Effects in Channelling Phenomena at High Energies

(E. Acerbi, C. Birattari, B. Candoni, M. Castiglioni, G. Dutto, G. Fait, C. Succi)

Lettere al Nuovo Cimento Vol. III 1970

Charge Exchange Cross - Sections of Protons in Solid Materials

(E. Acerbi, C. Birattari, B. Candoni, M. Castiglioni, G. Dutto, G. Fait, C. Succi)

Lettere al Nuovo Cimento Vol. III 1970

Il ciclotrone A. V. F. da 45 MeV per protoni di Milano: estrazione del fascio ad energia variabile da 20 a 45 MeV

(E. Acerbi, C. Birattari, M. Castiglioni, M. Fois, G. Dutto, G. Fait, C. Succi)

INFN/TC - 70/13 1970

An Absolute manometer for Gas in the Range of 10^{-3} 10^{-2} torr

(E. Acerbi, M. Castiglioni, G. Dutto, G. Fait, F. Resmini, C. Succi)

Nuclear Instruments and Methods 85 pag. 45 1970

Cross-Sections for Electron Capture by Fast Protons in Tellurium

(E. Acerbi, C. Birattari, B. Candoni, M. Castiglioni, D. Cutrupi, G. Dutto, C. Succi)

Lettere al Nuovo Cimento Vol. VII 1973

Collisional Electron Detachment from Hydrogen Atoms between 22 and 45 MeV

(E. Acerbi, C. Birattari, B. Candoni, M. Castiglioni, D. Cutrupi, G. Dutto, C. Succi)

Lettere al Nuovo Cimento Vol. X 1974



Several papers on Nuovo Cimento
the Journal of SIF

In Summary

His short period in Milano was very important for his training and to develop his passion on the construction and developments of particle accelerators

In spite of the short period spent here he left a very good memory for his ability and capability to be an innovator and bring new ideas

He kept important scientific ties with the accelerator group in Milano, particularly at the time in which the Superconducting cyclotron was built (partly in Milano and then in Catania).

But also later during his longstanding involvement in research work in the field of accelerator technologies, with which he greatly contributed by collaborating around the world, Milano and Italy were among them

His legacy is precious also in Milano for the many projects carried out at our laboratory LASA (see the presentation of Dario Giove)

.....and his desire and to make always progresses at the top level will stay with us indeleibly

