

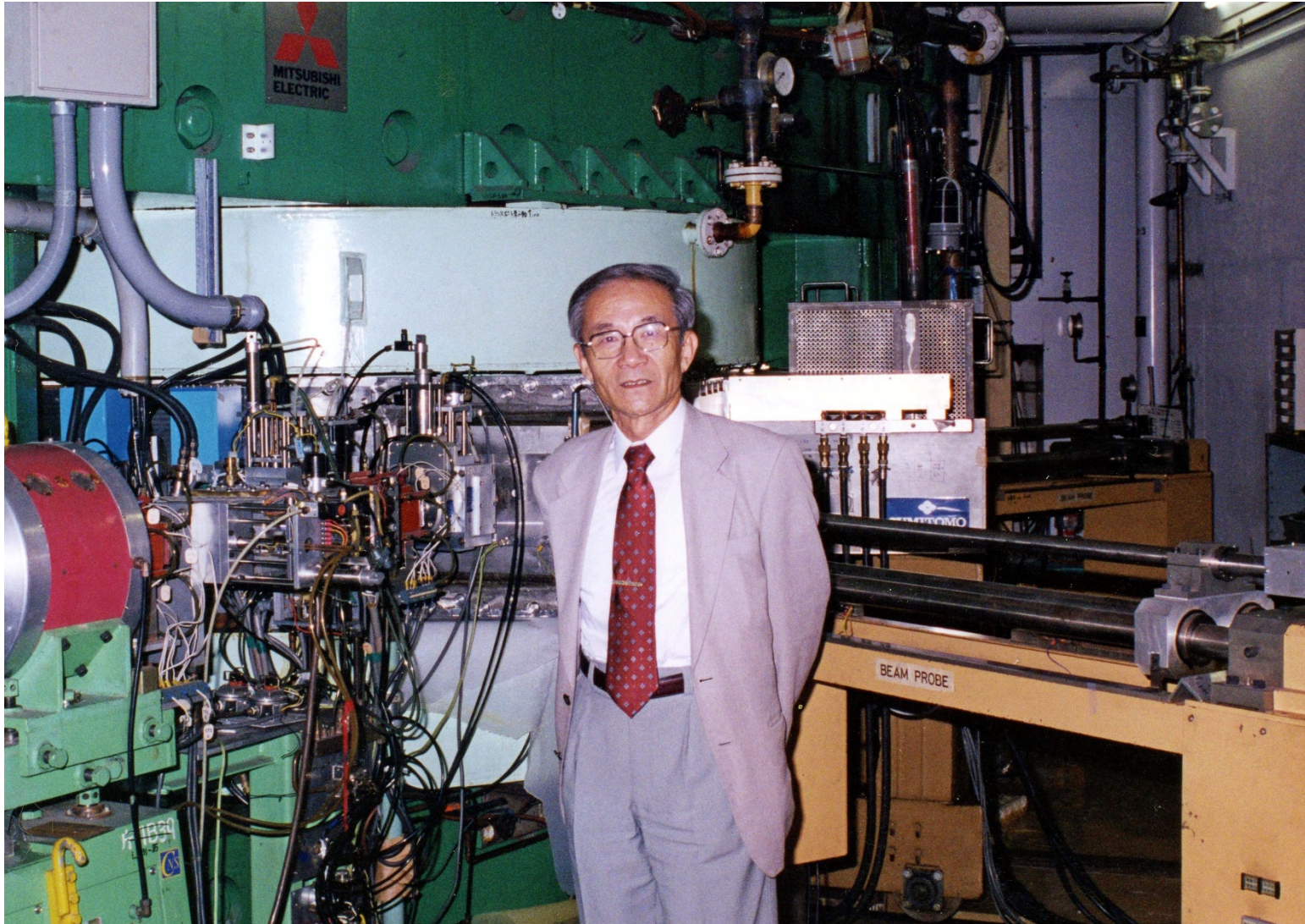
in memoriam

prof. Henk Hagedoorn (1934 – 2015)



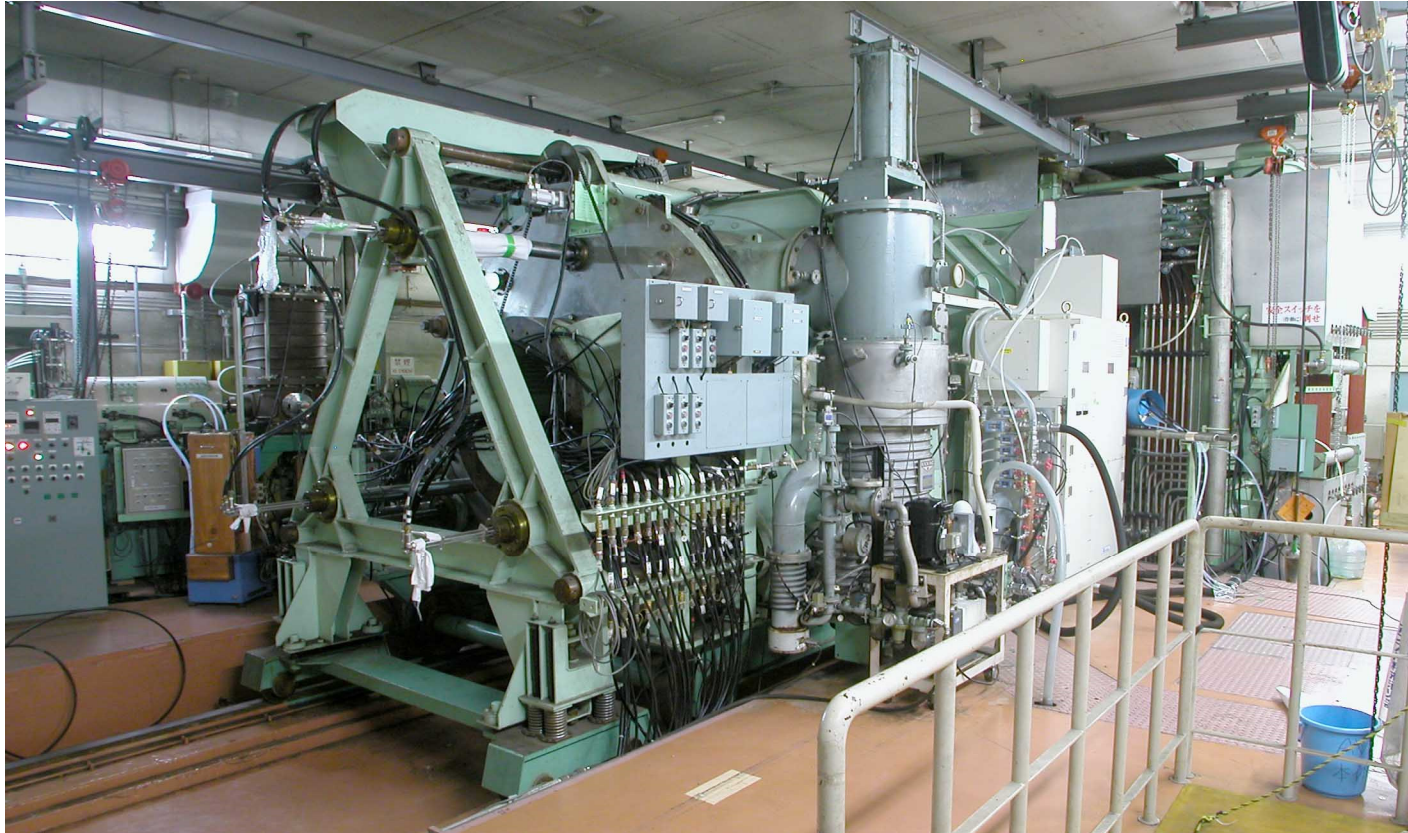
in memoriam

prof. Yusao Hirao (1930 – 2016)



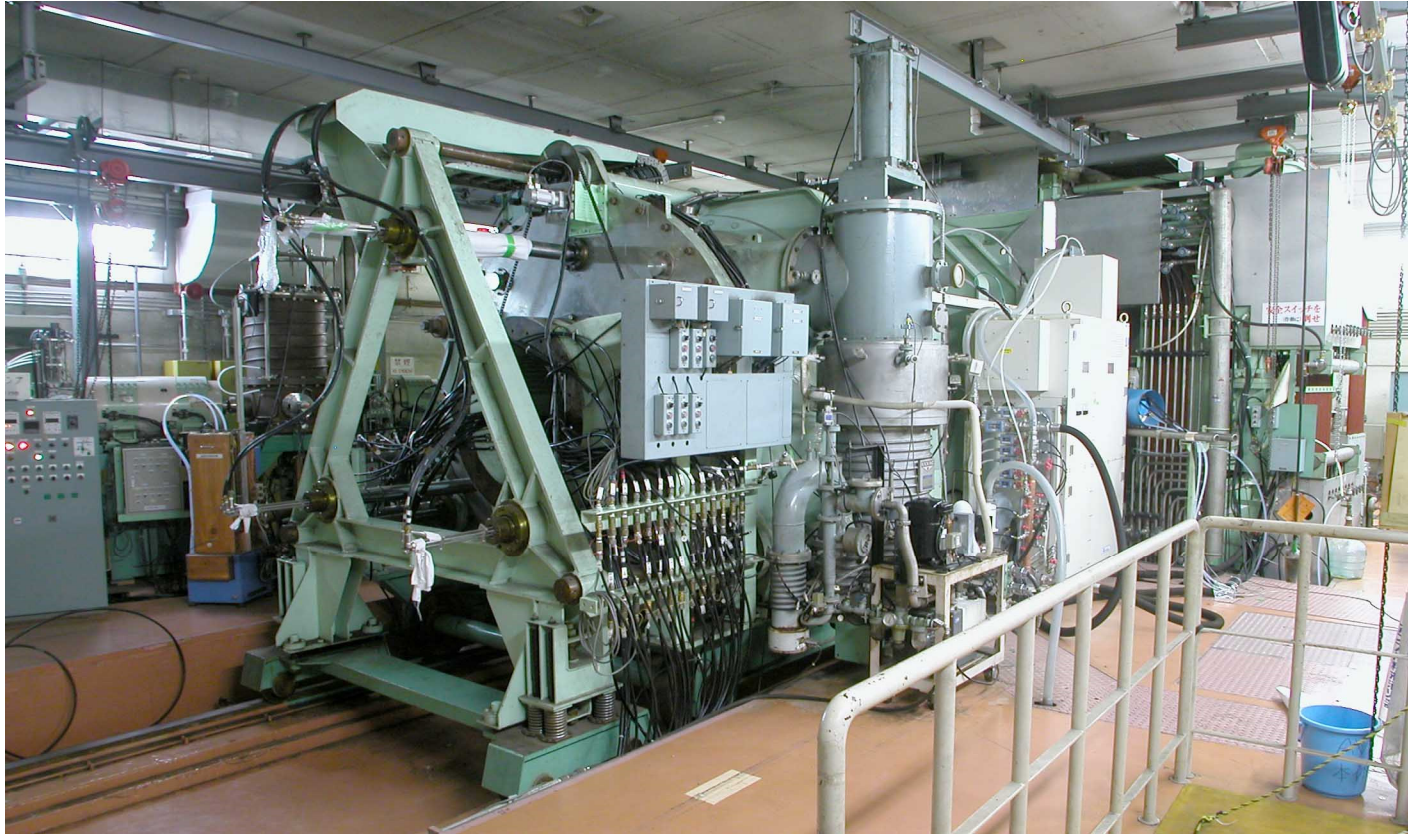
in memoriam prof. Yasuo Hirao

- early days: development of $k=130$ AVF cyclotron RCNP



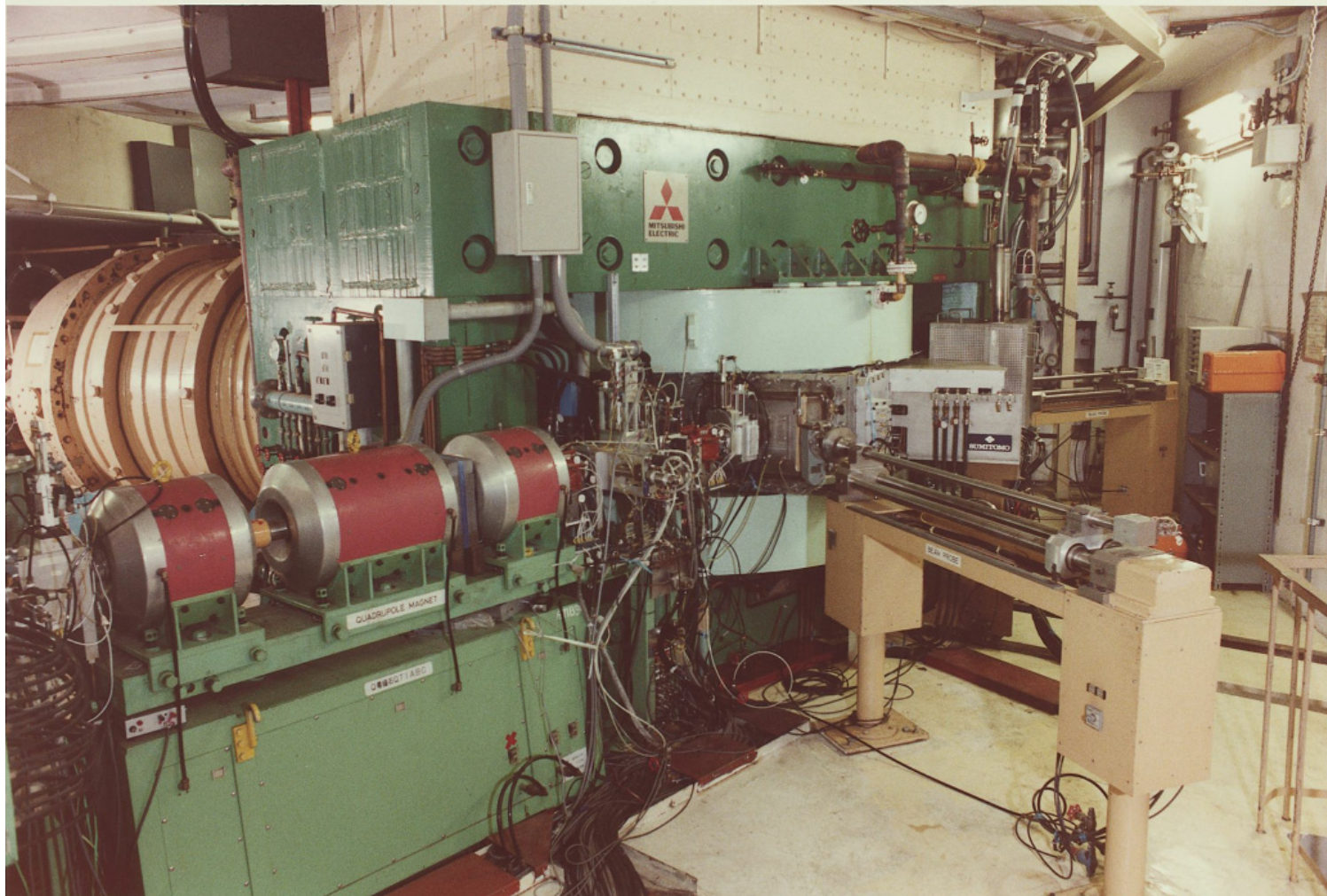
in memoriam prof. Yasuo Hirao

- design of $k=130$ AVF cyclotron RCNP, Osaka



in memoriam prof. Yasuo Hirao

- design and construction of SF-cyclotron INS, Tokyo



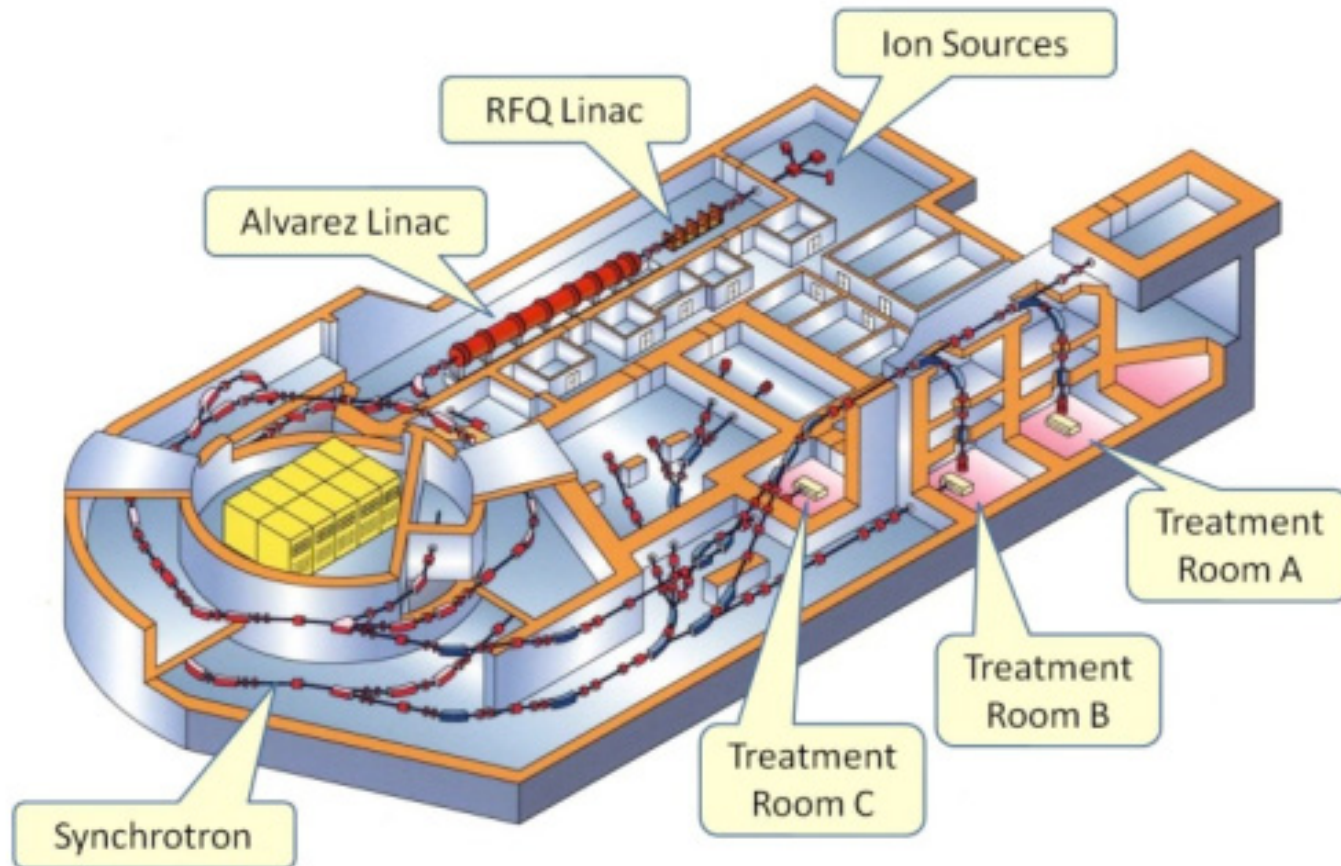
in memoriam prof. Yasuo Hirao

- 1979: NUMAtron project at INS: 1 GeV/amu



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- 1985 - 1993: HIMAC @ NIRS: heavy ion tumor therapy



in memoriam prof. Henk Hagedoorn



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- 1963: prototype AVF cyclotron Philips 27 MeV



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- 1974: PSI injector I with two RF systems:
 - 50.6 MHz for 72 MeV protons (injector mode)
 - variable frequency for other beams



in memoriam prof. Henk Hagedoorn

NUCLEAR INSTRUMENTS AND METHODS 18,19 (1962) 201–228; NORTH-HOLLAND PUBLISHING CO.

Part IV. Orbit Theory 201–293

ORBITS IN AN AVF CYCLOTRON

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Presented by H. L. Hagedoorn

A theory is given describing the motion of ions in an AVF cyclotron. A Hamiltonian is formulated for the radial and also for the vertical motion. By the application of canonical transformations the equations for the radial motion are solved up to third degree terms in the oscillation amplitude, for the vertical motion only in the linear approximation. The lowest order terms in the flutter amplitude are given. The influence of small field errors on the radial motion is studied.

- development of analytical theory based on Hamiltonian analysis: a constant of motion throughout Henk Hagedoorn's research

acknowledgement

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for providing information on prof. Hirao's career
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 - Jan Botman
 - Wiel Kleeven
for completing my knowledge on prof. Hagedoorn's work