TANDEM-ALPI

NEWSLETTER

July 1994, Issue No 7

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1. Overview.

The user program at the XTU-Tandem has been running quite succesfully in the first part of 1994 allowing the completion of several experiment, as reported in Tab.1.

An important milestone in the use of heavy ions beams at Legnaro was the first reaction studied with the beam from the ALPI superconductive Linac, as reported below. Beams of heavy ions (^{28}Si, ^{32}S, ^{58}Ni, ^{63}Cu and perhaps Ge) from the XTU Tandem-ALPI accelerator complex are expected to be produced during the second part of 1994 allowing both accelerator and user tests.

The project of building a third experimental area at the Tandem-Alpi complex has been funded by I.N.F.N. with the aim of providing a suitable room for EUROBALL and running independently the Tandem accelerator and the ALPI linac when the new injector (ECR source + RFQ + low-β linac) will be in operation (1998).

The accelerator schedule for the period September-December 1994 is enclosed.

2. First beam test of the Superconductive Linac ALPI

On May 24 1994 a 345 MeV ^{58}Ni beam from the ALPI superconductive accelerator was extracted and sent to the GASP array target area.

32 accelerating cavities were used to raise the equivalent terminal voltage of the Tandem XTU+ALPI complex up to 27.5 MV. The Tandem injector was working at 15 MV.

In the first test experiment a ^{208}Pb thick target was used (GASP-KRAKOW collaboration, 94/L/01 spokesperson R. Broda). The preliminary analysis of the gamma-gamma coincidences revealed the intense production of many Ni isotopes arising from neutron transfer reactions. Discrete gamma-ray coincidences provided a clear-cut identification of all Ni isotopes from A=58 to A=67 produced in various processes from inelastic to deep inelastic scattering resulting in the net transfer up to 9 neutrons. Correspondingly the heavy reaction partners were also identified. They include all Pb isotopes from the ^{208}Pb target nucleus up to the lightest ^{194}Pb. The latter is apparently produced by transfer of many neutrons followed by evaporation from the excited primary fragments. Samples of the spectra are reported in Fig.1.

These results were announced by Prof. L. Maiani, President of I.N.F.N., in the opening session of the Nucleus-Nucleus Collisions Conference in Taormina.

6. The PAC meeting.

The Program Advisory Committee met at L.N.L on May 23-24, 1994, to review the Tandem experimental proposals for the period July-December 1994.

The amount of time to be assigned to new proposals using Tandem beams in this period was 65 days besides the carry-over from previous periods (11 days) and the time devoted to the next Linac ALPI tests (26 days).

29 new proposals for Tandem beams were presented to the PAC, accounting for more than twice the available time (137 days).

The recommended experiments are listed in Table II.

7. The Next User and PAC Meetings

The next meeting of the Tandem-ALPI users will take place on November 4 at LNL, starting from 10 am. The goal of the meeting is to provide the users with complete information on the possibility of using Tandem and Linac beams during the first half of the 1995 (period to be allocated by the next PAC meeting which will take place temptatively on December 19-20, deadline for proposal presentation November 15).

7. Mailing List of the TANDEM-ALPI accelerator.

After the first three years we are now upgrading the official Mailing List of the XTU Tandem-ALPI Linac Facility at Laboratori Nazionali di Legnaro. People in the Mailing List will receive the Tandem-Alpi NEWSLETTER, Call for proposals and Accelerator beam schedules. Please, indicate your interest to be retained in the Mailing List by filling the attached form or simply sending an e mail message to VIESTI@LEGNARO.INFN.IT.

8. Progress in Negative Ion Sources

During the last 6 months special effort was devoted to the production of calcium beams on the negative ion source test bench. For these tests we have used the new source SNICS, which will be mounted in the negative injector during the next summer. Using commercial calcium hydride we could produce an average current of 300 nA of ^{40}Ca for one week. During 12 days we were always above 120 nA, working with one target only. We tested successfully also a small sample ($\sim$20 mg) of Ca hydride produced by the target laboratory at LNL. This target worked for 60 hours at 300-400 nA of beam current. This means that we are able to produce targets of Ca hydride also starting from isotopic material commercially available in the form of oxide.

According to hour experience, the Ca negative ion beam production for long time and with reasonable current intensities is very critical, depending on many parameters like the continous search for the optimum cathode position (which is changing with the time due to target consumption), the choice of the extraction potential in order to prevent overload of the extraction power supply and the cleanliness of the ionizer. A solution for routine production of Ca beams could be the use of a dedicated source.

For more details contact F. Scarpa, G. Binelle or A. Facco at L.N.L.

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MAILING LIST OF THE TANDEM-ALPI
ACCELERATOR AT LABORATORI NAZIONALI DI LEGNARO.

Name :

Affiliation :

Mailing Address :

Phone :

Telefax :

E-Mail :

Please return the present form to G. Viesti, Coordinatore Tandem-Alpi, Laboratori Nazionali di Legnaro, Via Romea 4, I-35020 Legnaro (Padova).

TABLE I

EXPERIMENTS COMPLETED AT XTU TANDEM

IN THE PERIOD JANUARY-JUNE 1994

94.1 Exotic radioactivity
(R. Bonetti (Milano))

94.2 Detector tests for the Garfield proposal
(F. Gramegna (LNL))

94.5 Radiation damage in Si detectors
(D. Bisello (Padova)).

94.6 The decay of S.D. bands in the A=130 region
(C. Rossi-Alvarez (Padova))

94.7 Final test of the new focussed time-of-flight spectrometer
(G. Montagnoli (Padova))

94.9 Fission-Evaporation competition in the decay of ^{200}Pb
(G. Viesti (Padova))

94.10 Search for unfavoured components in pseudo-spin alligned structures of doubly odd deformed nuclei (A. Kreiner (Buenos Aires) and D.R. Napoli (LNL))

94.13 Evidence of linking transitions in the decay out of the ^{148}Gd SD band
(G. De Angelis (LNL))

94.16 Measurement of the two-neutron correlation functions from the ^{44}Ca compound nucleus (N. Colonna (Bari))

94.17 Study of the nucleus ^{124}I
(G. Lobianco (Milano)).

94.18 Study of the miniorange electron spectrometer
(G. Lobianco (Milano))

94.20 Deformation parameters of ^{192}Os and ^{194}Pt measured by fusion reactions with a ^{16}O beam (F. Scarlassara (Padova))

94.21 Acoustic detection of proton beams in solid targets using tunnelling electromechanical trasducers (R. Onofrio (Padova))

94.22 Lifetime measurement of high spin states in ^{45}Sc nucleus
(P. Bednarczyk (LNL))

94.23 DSAM lifetime measurements in ^{186}Hg for studying shape coexistence
(F. Brandolini (Padova))

94.24 In beam tests for prototype modules of the 8πLP project
(G. Prete (LNL))

93.27b Electromagnetic decay properties of deformation-driving orbitals in ^{161}Lu
(R. Chapman (Manchester))

TABLE II: EXPERIMENTS APPROVED BY THE PAC

FOR THE CYCLE JULY-DECEMBER 1994

94.19 Decay out of the t-band in ^{128}Ba and search for SD states
(P. Sala (Koeln))

94.26 Radiobiology: Molecular and cellular effectiveness of charged particles and neutrons
(R. Cherubini (LNL))

94.27 Spectroscopy of the ^{76}Ge+^{82}Se collision products.
(R. Broda (Krakov)).

94.28 Multinucleon transfer reactions in ^{40}Ca+^{124,116}Sn
(L. Corradi (LNL))

94.29 Search for parity violation in the 17/2- isomer in ^{93}Tc
(L. Muller (Padova))

94.30 Test experiment for unstable beams at around 30 MeV
(C. Signorini (Padova))

94.31 Optimization of working parameters of microstrip gas chambers
(F. Gramegna (LNL))

94.32 Optimization of working parameters of MWPC, telescopes
(F. Gramegna (LNL))

94.35 ELCOM measurement of lifetime of first excited 0^+ state in ^{76}Kr
(A. Giannatiempo (Fi))

94.36 GDR in excited ^{200}Pb
(G. Viesti (Padova))

94.37 Design and construction of a 4π LP detector
(G. Prete (LNL))

94.38 Search for SD bands in ^{145}Ga
(R.M. Lieder (KFA Juelich))

94.40 Hyperdefermation in ^{152}Dy
(C. Rossi Alvarez (Padova))

94.41 Measirements of E3 strenghts in ^{144}Nd.
(A.M. Bizzeti-Sona (Firenze)).

94.45 Search for multiphonon effects in the sub-barrier fusion of ^{36}S+^{110}Pd
(G. Montagnoli (Padova))

94.46 Study of pseudo-spin couplings in structures of of doubly odd deformed nuclei
(A.J. Kreiner (Buenos Aires) and D. Napoli (LNL))

94.47 Lifetimes of the decay from the superdeformed to normal deformed states in ^{133}Nd.
(S. Lunardi (Padova)).

94.48 Barrier distributions from precision measurement of ^{32}S + ^{92,100}Mo fusion excitation function
(F. Schindler (Muenich))

94.50 Radiation damage in high temperature superconductors
(E. Mezzetti (Torino))

94.52 High spin states and multiparticle alignements in ^{138}Sm
(R. Menegazzo (Padova))

TABLE III

Negative Ion Beams currently available at the XTU Tandem

ION	I (nA)	
^{1}H	1000	
^{2}H	300	
^{7}Li	200	
^{12}C	3000	
^{13}C	200	
^{16}O	2000	
^{18}O	500	
^{19}F	3000	
^{25}BN	800	for ^{11}B and ^{14}N beams
^{28}Si	1000	
^{29}Si	300	
^{30}Si	200	
^{32}S	2000	
^{33}S	400	enriched material
^{36}S	400	enriched material
^{35}Cl	1000	
^{37}Cl	600	
^{40}Ca	300	tested only on the test bench
^{48}TiH	700	
^{51}V	250	
$^{52}CrH_2$	100	
^{54}Fe	200	
^{56}Fe	200	
^{58}Ni	1500	
^{60}Ni	500	
^{63}Cu	600	

^{64}Ni	500	enriched material
^{64}ZnO	700	tested only on the test bench
^{65}Cu	600	
^{51}VO	500	
^{74}Ge	700	
^{79}Br	800	
^{127}I	800	
^{197}Au	500	

TANDEM XTU SCHEDULE FOR SEPTEMBER-DECEMBER 1994

CALENDARIO TANDEM XTU PER SETTEMBRE-DICEMBRE 1994

Sep. 20-23	94.28	L. Corradi	-20^{o}II	^{40}Ca 13.5-15.3 MV
Sep. 24	TANDEM CONDITIONING			
Sep. 25-26	94.27	R. Broda	-10^o (GASP)	^{76}Ge, ^{82}Se puls.(1) 15.5 MV
Sep. 27-29	93.27	R. Chapman	-10^o (GASP)	^{28}Si 14.9 MV
Sep. 30-Oct.5	94.15	S. Lunardi	-10^o (GASP)	^{48}Ti 15.-15.5 MV
Oct. 6-9	94.19	P. Sala	-10^o (GASP)	^{50}Ti,^{36}S (2) 15.-13.6 MV
Oct. 10-11	94.31	F. Gramegna	+50^o (S.S.)	^{32}S,^{28}Si 14.5-15. MV
Oct. 12-15	94.08	D. Fabris	-40^{o}II	^{28}Si 15.1 MV
Oct. 16-20	94.38	R.M. Lieder	-10^o (GASP)	^{36}S (2) 14.-15. MV
Oct. 21-23	94.46	Kreiner-Napoli	-10^o (GASP)	^{11}B 12.4-14.5 MV
Oct. 24-30	LINAC			
Oct. 31-Nov.4	94.45	G. Montagnoli	-20^{o}II	^{36}S,^{16}O (2) 13-14 MV
Nov. 5	94.35	A. Giannatiempo	+10^o	^{12}C 8. MV
Nov. 6-13	MAINTENANCE&CONDITIONING			
Nov. 14-20	LINAC			
Nov. 21-26	94.47	S. Lunardi	-10^o (GASP)	^{32}S 15. MV
Nov. 27	94.32	F. Gramegna	+50^o (S.S.)	^{32}S,^{28}Si puls 14.5-15. MV

Nov. 28-Dec. 4	LINAC			
Dec. 5-8	94.36	G. Viesti	-10^o (GASP)	^{19}F 13.-14. MV
Dec. 9	94.50	E. Mezzetti	+50^o (S.S.)	^{16}O 14.-15. MV
Dec. 10	94.41	A.M.Sona-Bizzeti	-10^o (GASP)	^{18}O 11.-12 MV
Dec. 11	94.24	G. Prete	-40^{o}II	^{12}C,^{16}O 14. MV
Dec. 12-16	LINAC			
Dec. 17-18	94.48	K.E.G. Loebner	-20^{o}II	^{32}S 13. MV
Dec. 19	NOT SCHEDULED			
Dec. 20-21	94.30	C. Signorini	-40^o (RMS)	^{12}C,^{11}B (3) 10.-15. MV
Dec. 21	94.26	R. Cherubini	+60^o	(4)
Dec. 22	94.24	G. Prete	-40^{o}II	^{12}C,^{16}O 14. MV

(1) Beam tests.
(2) Isotopic material to be provided by the user group.
(3) Up to 8 p.m., Dec 21.
(4) Starting from 8 p.m., Dec 21; Beam/Beams to be defined.

BEAM TESTS LINAC

24 Oct.	25 Oct.	26 Oct.	27 Oct.	28 Oct.	29 Oct.	30 Oct.
SET-UP	340 MeV ^{58}Ni	Stefanini	Stefanini	SET-UP 310 MeV ^{65}Cu	Nebbia	Nebbia
14 Nov.	15 Nov.	16 Nov.	17 Nov.	18 Nov.	19 Nov.	20 Nov.
SET-UP	300 MeV ^{32}S	Sandoli	Sandoli	Sandoli Fiore	Fiore	Fiore
28 Nov.	29 Nov.	30 Nov.	1 Dec.	2 Dec.	3 Dec.	4 Dec.
SET-UP	280 MeV ^{28}Si	Fabris	Fabris	Test Linac	Test Linac	Test Linac
12 Dec.	13 Dec.	14 Dec.	15 Dec.	16 Dec.		
Development of Ge beams						