The dipole response of proton-rich nuclei: pygmy and giant resonances in ^{32}Ar and ^{34}Ar

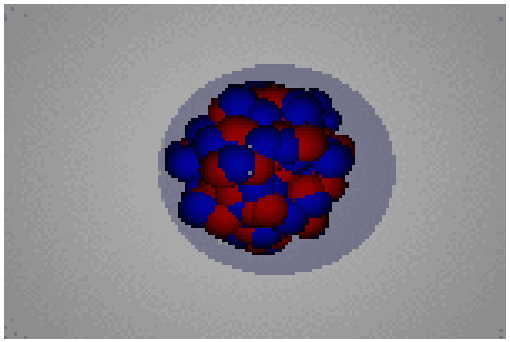
Spokesperson: K. Boretzky (GSI)

S327 Collaboration:

Y. Aksyutina[1], T. Aumann[1], S. Beceiro[2], P. Benlliure[2], K. Boretzky[1], M. Chartier[3], D. Cortina[2], U. Datta Pramanik[4], O. Ershova[5], H. Geissel[1], R. Gernhaeuser[6], M. Heil[1], G. Ickert[1], H. Johansson[7], B. Jonson[7], A. Kelic[1], A. Klimkiewicz[8], J.V. Kratz[9], R. Kruecken[6], R. Kulessa[8], C. Langer[5], K. Larsson[1],T. Le Bleis[1], R. Lemmon[10], O. Lepyoshkina[6], K. Mahata[1],T. Nilsson[7], V. Panin[1], R. Plag[1,5], R. Reifarth[1,5], V. Ricciardi[1], D. Rossi[9], S. Schwertel[6], H. Simon[1], K. Sümmerer[1], B. Streicher[2], J. Taylor[3], J. Vignote[1], F. Wamers[1], H. Weick[1], C. Wimmer[5], P. Wu[3]

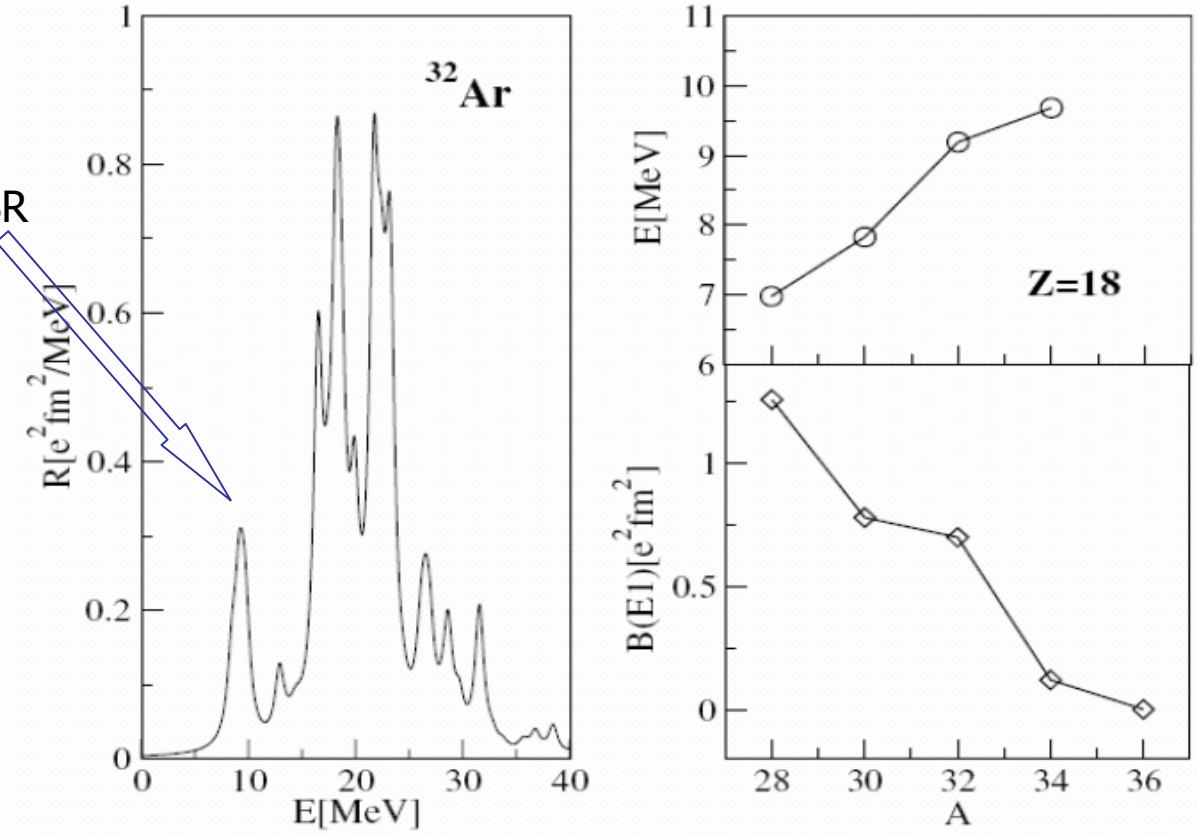
1) GSI Darmstadt 2) Univ. Santiago de Compostela (Spain) 3) Univ. Liverpool (UK)
4) SINP Kolkata (India) 5) Univ. Frankfurt (Germany) 6) TU Muenchen (Germany)
7) Univ. Göteborg (Sweden) 8) Univ. Krakow (Poland) 9) Univ. Mainz (Germany)
10) Univ. Daresbury (UK)

all slides preliminary, experiment from Aug'08



proton pygmy predictions

≈ 6 % EWSR



N.Paar et al.,

Phys.Rev.Lett. 94

(2005) 182501

Fig.1: *The isovector dipole strength distribution in ^{32}Ar, calculated in the framework of RHB and RQRPA (left panel). In the right panel the mass dependence of the pygmy peak and the corresponding integrated dipole strength below 10 MeV are shown. From [Paa-05b].*

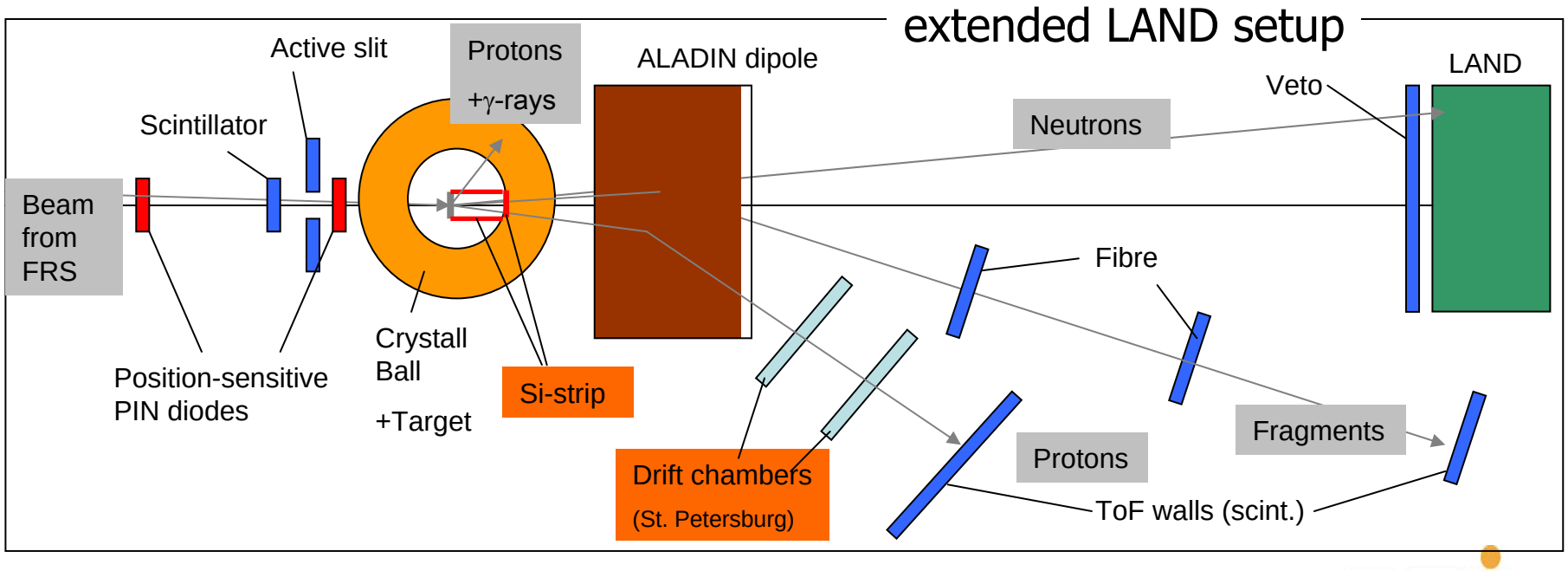
Coulomb excitation of ^{32}Ar and ^{34}Ar at 700 MeV/u on Pb

⇒ proton pygmy dipole resonance & giant dipole resonance region

detection of all outgoing particles (heavy fragments, protons, γ-rays, neutrons)

⇓

energy differential cross section (invariant mass method)



Beam time from 23rd to 31st of August 2008

2 days: use of ^{40}Ar from MUCIS:

- for calibration
- production of ^{34}Ar (intended)

6 days: use of ^{36}Ar from MUCIS:

- production of ^{32}Ar
- production of ^{34}Ar

statistics collected: ^{32}Ar about 2 M events

~ 3500 events in pygmy region

(assuming 100 mb @ 9 MeV)

FRS – Cave C ^{32}Ar transmission rate

- High intensity primary beam: ^{36}Ar @ 825 MeV / u
  Extraction time: 1s
  I (FRS) = 7 x 10^9 up to 1.5 x 10^{10} / spill

- Production target @ FRS:Be(6.347 g/cm^2)

- Transmissions similar to calculated ones:
  S2-S8: 75%, 95% calculated
  S8-CC: 51%, 51% calculated

- Secondary beam setting for ^{32}Ar:
  - Entrance of Cave C: 2200 particles/spill
  - 1/3 is ^{32}Ar → 730 ^{32}Ar ions/spill
  - Ratio ^{32}Ar/^{36}Ar: 1 x 10^{-7}

Incoming beam identification

Primary beam

^{36}Ar

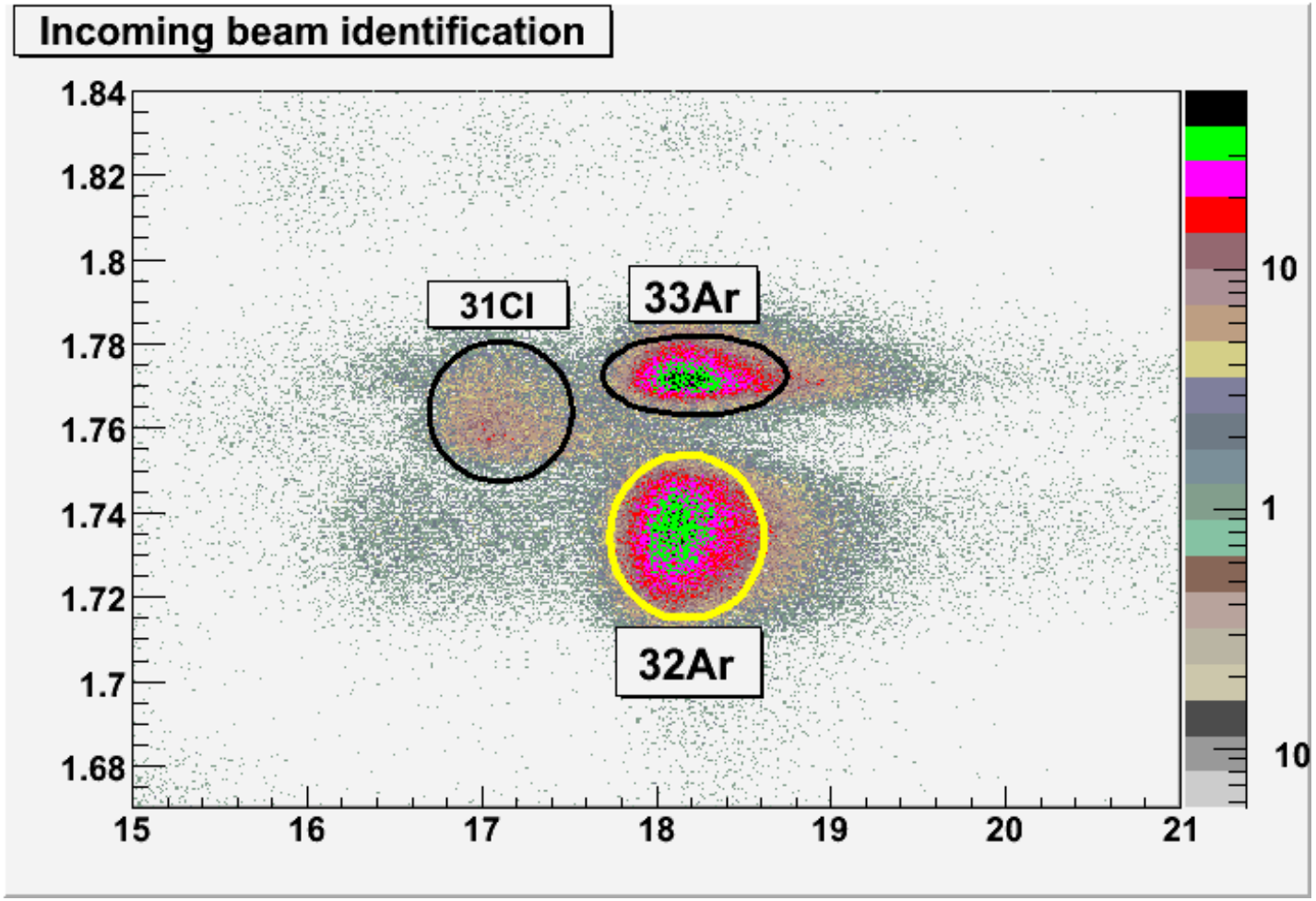
Secondary beam

^{32}Ar

Expected contaminants:

^{31}Cl

^{33}Ar



Rates: ^{32}Ar 2602 particles, ^{33}Ar 1970 particles, ^{31}Cl 783 particles

The dipole response of proton-rich nuclei: pygmy and giant resonances in ^{32}Ar and ^{34}Ar

Spokesperson: K. Boretzky (GSI)

S327 Collaboration:

Y. Aksyutina[1], T. Aumann[1], S. Beceiro[2], P. Benlliure[2], K. Boretzky[1], M. Chartier[3], D. Cortina[2], U. Datta Pramanik[4], O. Ershova[5], H. Geissel[1], R. Gernhaeuser[6], M. Heil[1], G. Ickert[1], H. Johansson[7], B. Jonson[7], A. Kelic[1], A. Klimkiewicz[8], J.V. Kratz[9], R. Kruecken[6], R. Kulessa[8], C. Langer[5], K. Larsson[1],T. Le Bleis[1], R. Lemmon[10], O. Lepyoshkina[6], K. Mahata[1],T. Nilsson[7], V. Panin[1], R. Plag[1,5], R. Reifarth[1,5], V. Ricciardi[1], D. Rossi[9], S. Schwertel[6], H. Simon[1], K. Sümmerer[1], P. Strehl[2], J. Taylor[3], J. Vignote[1], A. Wagner[5], H. Weick[1], C. Wimmer[5], P. Wu[3]

1) GSI Darmstadt 2) Univ. Santiago de Compostela (Spain) 3) Univ. Liverpool (UK)
4) SINP Kolkata (India) 5) Univ. Frankfurt (Germany) 6) TU Muenchen (Germany)
7) Univ. Göteborg (Sweden) 8) Univ. Krakow (Poland) 9) Univ. Mainz (Germany)
10) Univ. Daresbury (UK)

analysis in progress!!!