XXXII INTERNATIONAL SEMINAR of NUCLEAR and SUBNUCLEAR PHYSICS "Francesco Romano"

Silicon Drift Detectors for high precision kaonic atoms measurements: the SIDDHARTA-2 experiment

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On behalf of SIDDHARTA-2 collaboration

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SIDDHARTA-2 Collaboration

Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

Silicon Drift Detectors for Hadronic Atom Research by Timing Application

LNF-INFN, Frascati, Italy
SMI-ÖAW, Vienna, Austria
Politecnico di Milano, Italy
IFIN –HH, Bucharest, Romania
TUM, Munich, Germany
RIKEN, Japan
Univ. Tokyo, Japan
Victoria Univ., Canada
Univ. Zagreb, Croatia
Univ. Jagiellonian Krakow, Poland
ELPH, Tohoku University

STRONG-2020

Croatian Science Foundation, research project 8570

SIDDHARTA-2 Scientific Goal

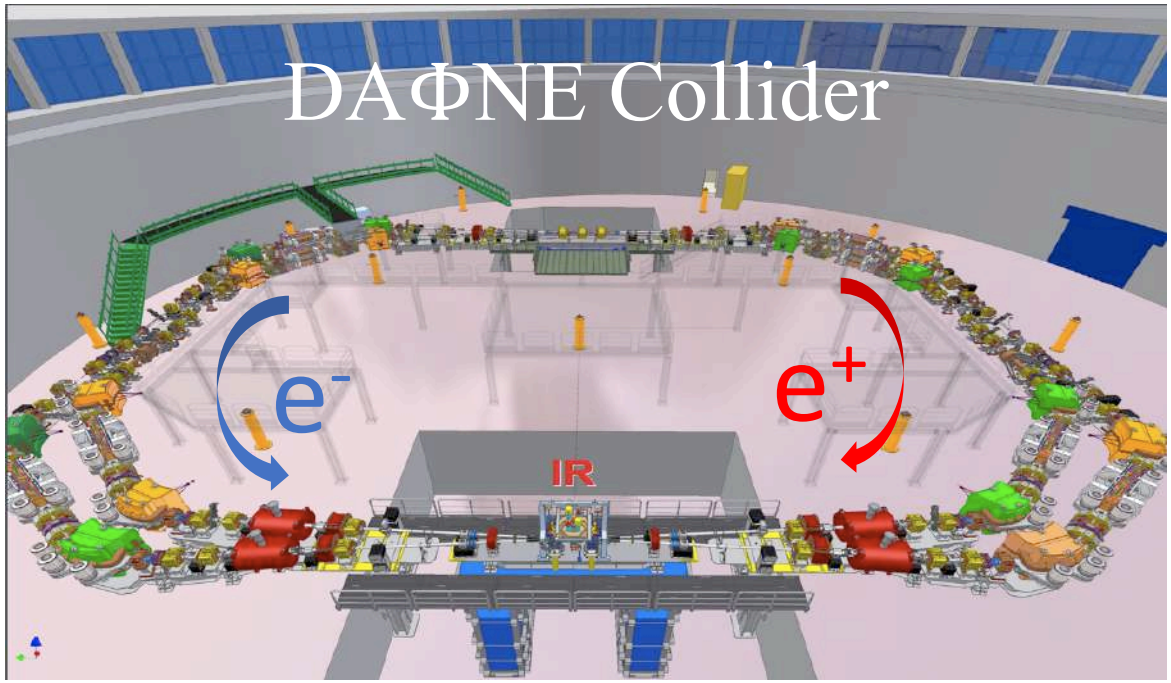
To perform precision measurements at threshold of kaonic atoms X-ray transitions

- unique information about QCD in the non-perturbative regime in the strangeness sector

Started with the precision measurement of **shift** and **width** of **kaonic hydrogen** (SIDDHARTA)

SIDDHARTA-2 AIM

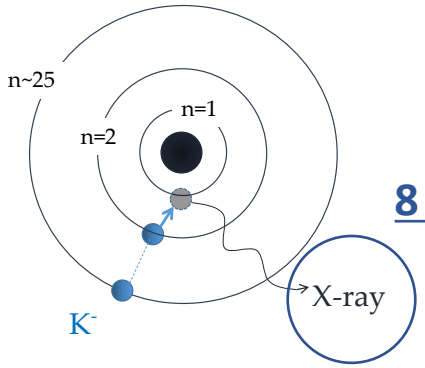
To perform the *first measurement ever of kaonic deuterium X-ray* transition to the ground state (1s-level) such as to determine its shift and width induced by the presence of the strong interaction



- $\Phi \rightarrow K^- K^+$ (49.1%)
- Monochromatic low-energy K^- (~127 MeV/c ; $\Delta p/p = 0.1\%$)

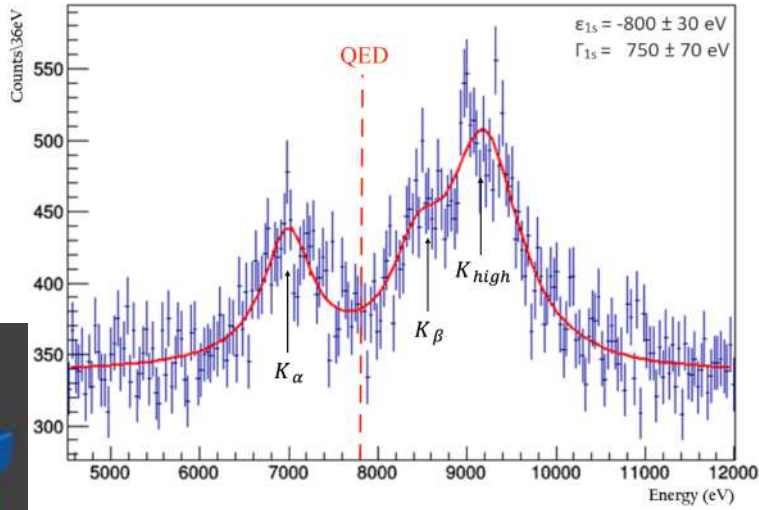
SIDDARATA-2 experiment

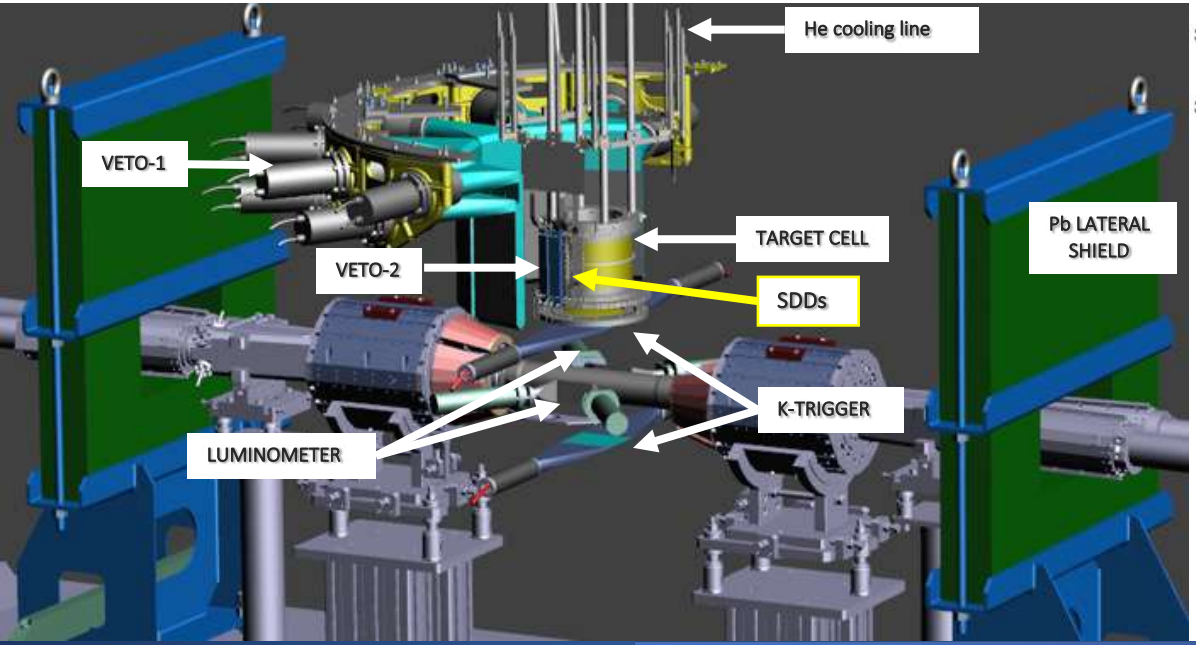
Kaonic Atom



8 keV signals

Monte Carlo simulation of SIDDHARTA-2 kaonic deuterium spectrum





SIDDHARTA-2 experimental apparatus

Large area Silicon Drift Detectors for X-ray spectroscopy

FONDAZIONE BRUNO KESSLER
FUTURE BUILT ON KNOWLEDGE

POLITECNICO MILANO 1863

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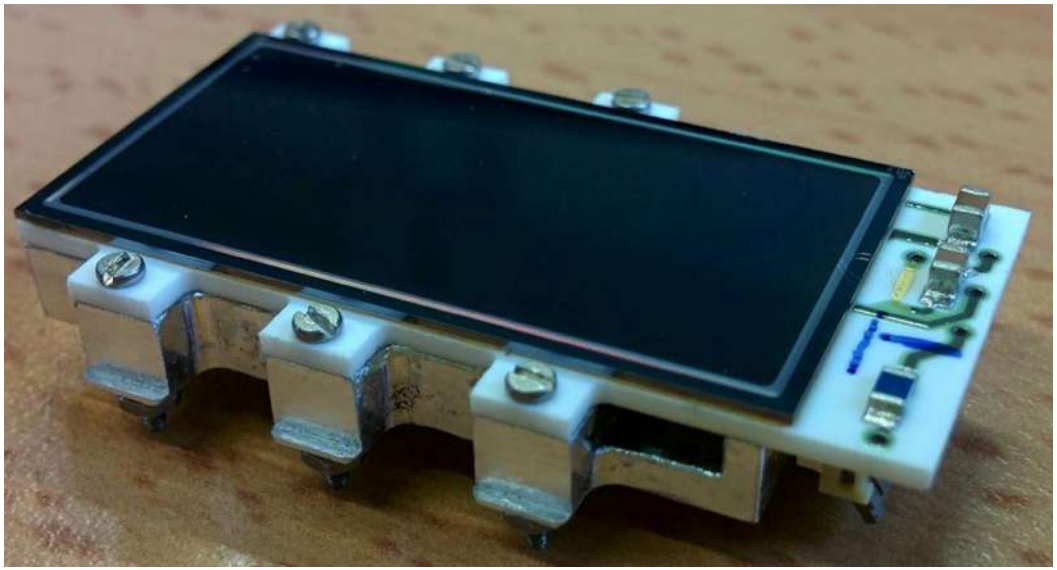
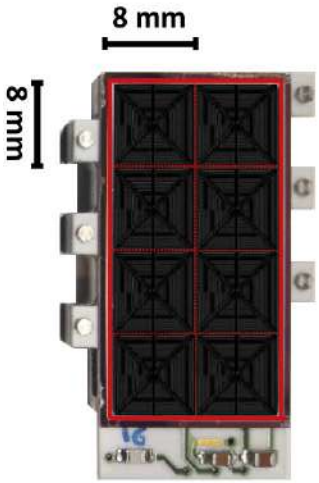
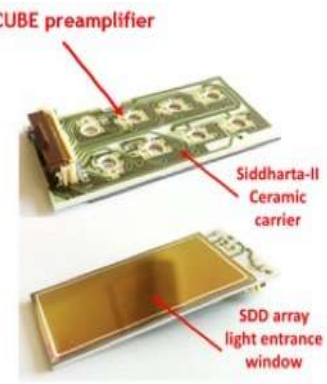
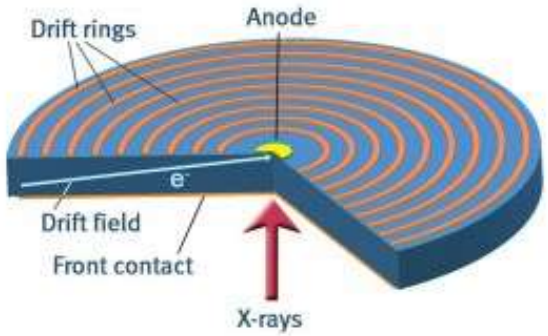
8 SDD units (0.64 cm^2)
for a total active area of 5.12 cm^2



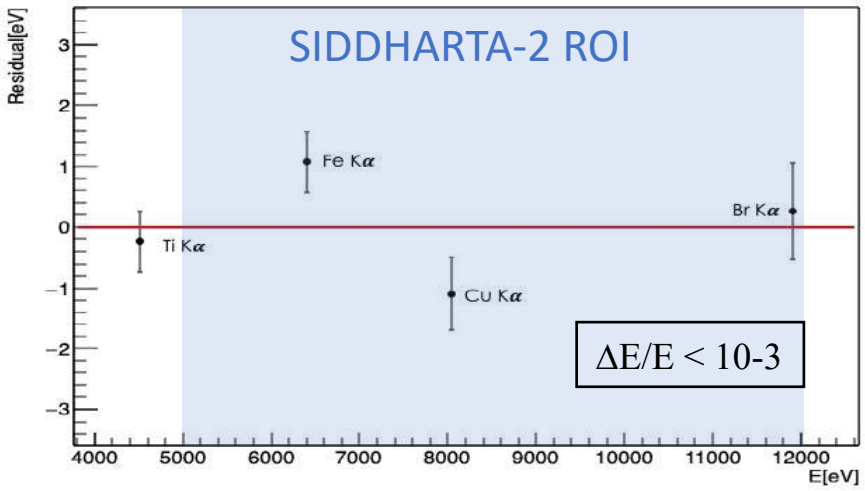




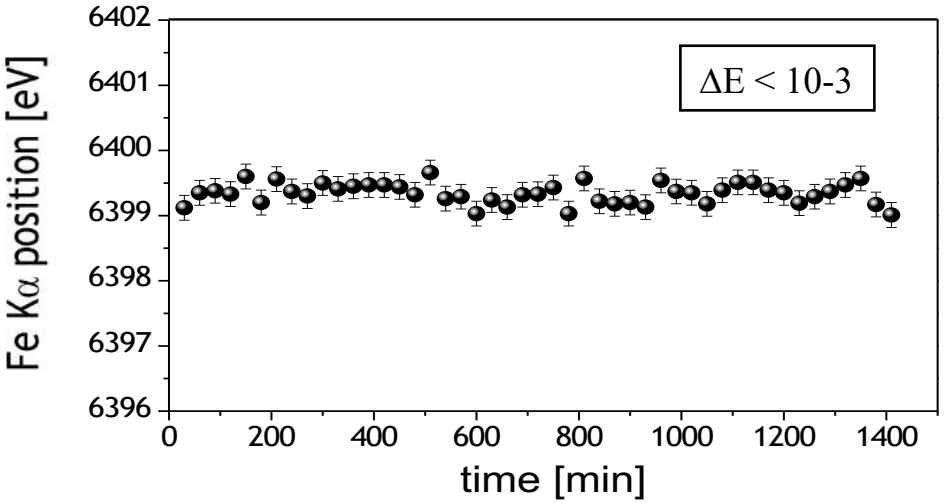


SDDs spectroscopy response

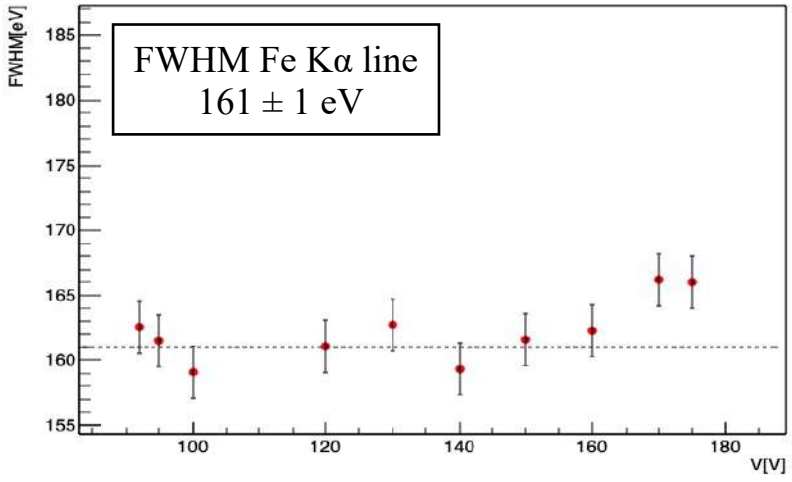
Linearity



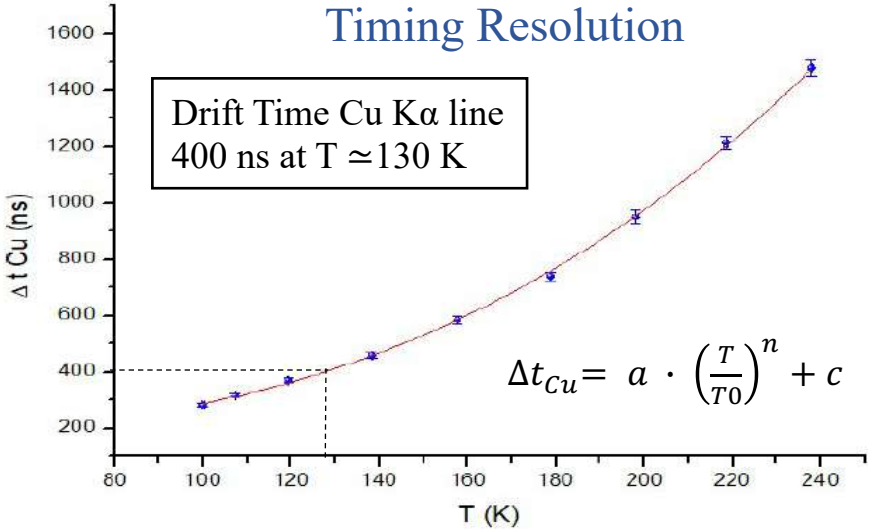
Stability



Energy Resolution

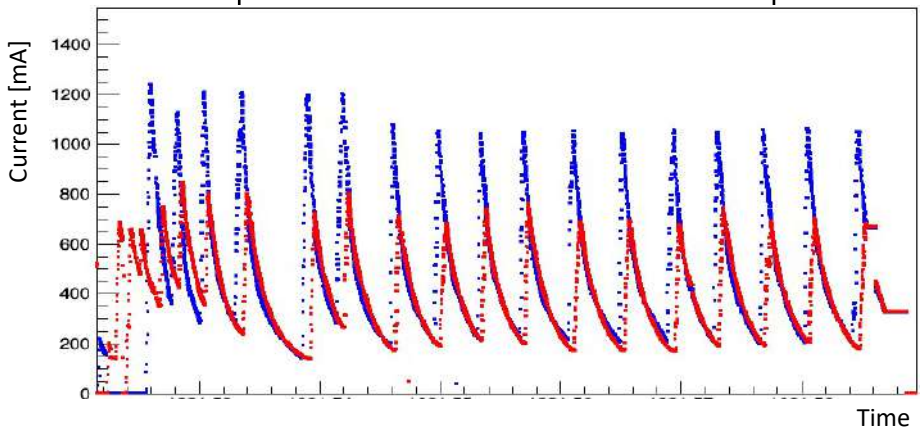


Timing Resolution

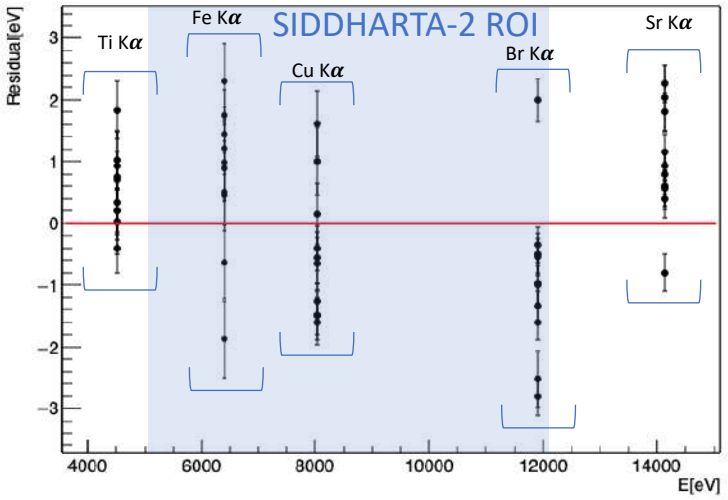


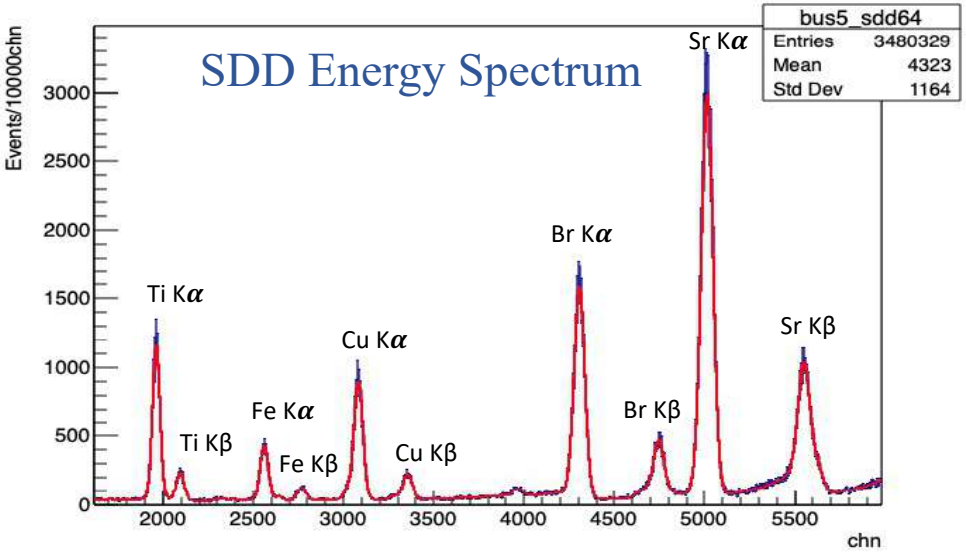
SDDs energy response during DAΦNE BCP

DAΦNE(BCP)
Beam Commissioning Phase
$e^- e^+$

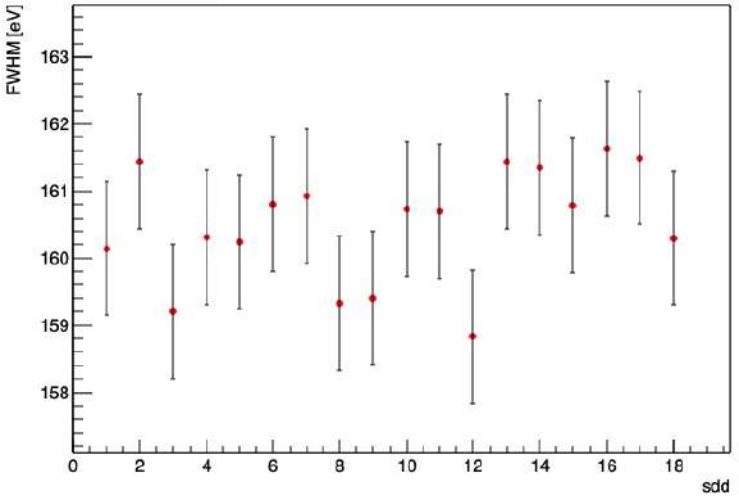


Linearity





FWHM Fe Kα line




THANK YOU