

Statement of Candidacy – Andrej Kugler

I am very pleased and honoured to be nominated as a candidate for BM@N IB Chair.

BM@N physics program is an essential continuation of HADES physics program as concern hadron probes for higher beam energy and, at the same time, it will give opportunity to study global features of compressed media before CBM@FAIR experiment became operational. Therefore, it is in the highest interest of the heavy ion community, particularly, of Czech physicists. This is, in short, our motivation to join BM@N collaboration and we are aiming to support it. The main task of IB Chair will be in forthcoming year to support spokesperson in his/her effort directed to finishing MoU with collaborating institutions, particularly, to convince, as much as possible, granting agencies of the member countries to support BM@N, as well as to obtain new collaborators.

Therefore, I agree to accept nomination for BM@N IB Chair and I am willing to use my experience obtained in the role of HADES CB Chair in period 2008-2014 in this context.

Curriculum vitae

Andrej Kugler

I graduated at the Faculty of Mathematics and Physics of Charles University in Prague in 1976. I started my physics career at Nuclear Physics Institute of Czech Academy of Sciences (NPI CAS Řež) in 1977, moving in 1981 to Laboratory of Nuclear Reactions of JINR, Dubna. Here, I successfully defended PhD thesis "*The study of some aspects of the high energy gamma-ray emission in heavy ion reactions*" in 1989. I return back to NPI CAS in 1990 serving as vice director of NPI CAS till 1998. Later, I served as head of Nuclear Spectroscopy Division in period 2002-2017.

I have founded Relativistic Heavy Ion (RHI) group in Nuclear Physics Institute at 1990. RHI group headed by me became a part of the international TAPS collaboration concentrated around European nomad detector, Two Arm Photon Spectrometer. We concentrated to the studies of flow of neutral mesons, nucleons and light nuclei. Particularly, sideward flow and squeeze-out of π^+ , nucleons and light particles, as well as energy spectra of neutrons, were studied by us in 1 A.GeV Bi+Pb collisions. It was firstly unambiguously established that magnitudes of flow are proportional to the mass of the fragments rather than to their charge [kug94]. We found for the first time experimental evidence for predicted anti-correlation between pions and nucleons in their angular distributions [kugp94]. Results of the above mention studies were used in PhD theses of my students, M. Pachr and Yu. G. Sobolev. During last TAPS campaign at GSI (1994-1995) emission of both η and π neutral mesons was studied by us in relativistic heavy ion collisions [ave97, mar97, wol98]. Particularly, we firstly observed η meson squeeze-out like azimuthal distribution relative to the reaction plane [tar97]. These activities resulted in PhD theses of my students A. Taranenko and R. Pleskac.

Further, we participated in design and build up of second generation spectrometer, the **H**igh **A**cceptance **D**i-**E**lectron Spectrometer (HADES) at the heavy ion accelerator facility UNILAC-SIS of the GSI Darmstadt. HADES is optimized to detect electron-positron pairs due to decay of vector mesons in medium. We concentrated to the Time-Of-Flight scintillator wall, part of HADES devoted to pre-selection of di-lepton candidates from high hadronic background in relativistic heavy ion collisions. All six sectors of the TOF wall (380 scintillator rods) produced in Czech Republic were installed and are used in HADES spectrometer. Recently, we finished installation of 4 sectors from 6 planned of new Electromagnetic Calorimeter at HADES@FAIR. We actively participated in HADES physics program during recent years. Particularly, we significantly contributed to the first observation of excess in dilepton yields in relativistic heavy ion collisions, i.e. Ar+KCl (F.Krizek PhD), in pion+p (P.Ramos forthcoming PhD), in observation of kaon's flow in Au+Au (L.Chlad forthcoming PhD), as well as in studies of pion flow in C+C, Ar+KCl and Au+Au relativistic collisions.

Last, we are participating together with colleagues from INR Moscow in R&D of Projectile Spectator Calorimeter (PSD) currently developed for CBM experiment at FAIR (V. Mikhaylov forthcoming PhD). The same modules are planned to be used in modified design as Zero Degree Calorimeter (ZDC) in BM@N experiment at NICA.

All above mentioned scientific activities resulted in number of papers in referred journals (more than two hundreds papers, Hindex=30), as well as in invited or contributed talks at international conferences. I am the principal investigator in corresponding projects supported by the Grant Agency of the Czech Republic (1993-2002, 2008-2017), by Ministry of Education, Youth and Sports of the Czech Republic (2007-2011, 2017-2021) and by the Grant Agency of the Czech Academy of Sciences (2991-1993, 2003-2007). Further, I am the main coordinator of Czech activities at FAIR covered by Large Research Infrastructure project FAIR-CZ supported by Ministry of Education, Youth and Sports of the Czech Republic since 2016.

I was also participating in past in the study of the emission of mesons and photons in Pb(160 GeV/A)+Pb ultrarelativistic collisions in the framework of WA98 experiment in 1994-95, as well as, I was in founding team of **A Large Ion Collider Experiment (ALICE)** at future accelerator complex, LHC CERN. The motivation of these ultrarelativistic heavy ion programs was the hope to observe quark-gluon plasma formation.

During recent years, I also served as Chair of the Nuclear Phys. Board of European Physical Society (2002-2004), Chair of the HADES Collaboration Board (2008-2014), Deputy of Chair of CBM Collaboration Board (since 2015). I am also member of different committees coordinating scientific policy of the Czech Republic, like Committee for Collaboration of the Czech Republic with CERN, Committee for Collaboration of the Czech Republic with JINR (till 1996), Scientific-Coordination Committee of Low and Middle Energy Physics, JINR (1991-2), scientific advisor of EC FP6 and FP7 program, etc.

I have founded series of international schools for young physicists (PhD students) in heavy-ion physics. These schools were carried out in collaboration with the chair of Nuclear Physics of Charles University at Prague in 1992, 1994 and 1996. Lectures were given by experts in the field, for example professors H. Löhner (Groningen, The Netherlands), P. B. Münzinger (Stony Brook, USA), R. Stock (Frankfurt, Germany), L. Moretto (Berkley, USA), etc. I also participated in organization and/or program committees of several international conferences, like 17th International Conference on Computing in High Energy and Nuclear Physics, Praha, 21-27. March, 2009; 13th General Conference of the European Physical Society "Beyond Einstein – Physics for the 21st Century", Bern, 11-15 July 2005; 18-th conference of Nuc.Phys.Division of EPS „Phase transitions in strongly interacting matter“, Praha, 23-29 August 2004, etc.

References

- [ago98] C.Agodi,... A.Kugler,... T.Marek,... R.Pleskac,... A.Taranenko, A.Tikhonov, P.Tlusty..., The Time Of Flight Wall for the HADES Spectrometer, IEEE Transactions on Nuclear Science, Vol.45, No 3., 1998, p. 665-669.
- [kugp94] A. Kugler, V. Wagner, M. Pachr, M. Šumbera, Yu.G. Sobolev, R. S. Simon, S. Hlaváč.: *Flow Effects in Bi+Pb Collisions at 1 GeV/u*, Acta Physica Polonica B25(1994)691-698.
- [kug94] A. Kugler, V. Wagner, M. Pachr, M. Šumbera, Yu.G. Sobolev, R. S. Simon, S. Hlaváč: *Emission of Nucleons and Light Fragments Relative to The Reaction Plane in Bi+Pb Collisions at 1 GeV/u*, Physics Letters B 335(1994) 319-325.
- [ave97] R.Averbeck, ...A.Kugler, ...R.Pleskac, ..P.Tlusty,V.Wagner et al.: *Production of pi0 and eta mesons in carbon-induced relativistic heavy-ion collisions*, Zeitschrift fur Phys. A 359 (1997) 65-73.
- [mar97] A.Marin,...A.Kugler,R.Pleskac,P.Tlusty,V.Wagner et al.: Exclusive pi0 and eta meson production in 40Ar+natCa at 800 AMeV , Phys.lett. B409 (1997) 77-82.
- [tar97] A. Taranenko, P. Tlustý, A. Kugler, V. Wagner, R. Pleskač, S. Hlaváč, R.S. Simon: *The Study of Neutral Pion Azimuthal Distribution in 58Ni+58Ni Reaction at 2 GeV/nucleon*, Czech. Journal of Phys 47(1997)891-898.
- [wol98] A.R.Wolf,...A.Kugler,...R.Pleskac,..P.Tlusty,...V.Wagner...Multistep production of eta and hard pion mesons in subthreshold Au-Au Collisions, Phys.Rev.Lett., Vol.80, 1998, page 5281-4.