Научном већу Института за физику

На седници Научног већа Института за физику одржаној 15.12.2020. године изабрани смо у комисију за избор др Пасија Хуовинена у звање научни саветник. Након прегледа приложеног материјала подносимо Научном већу следећи

ИЗВЕШТАЈ

Напомена: У договору са аналитичарем за физику, Андријаном Ивановић, увод и закључак су на српском, док је остатак документа на енглеском језику, пошто је материјал преузиман из извештаја кандидата. Хвала пуно на разумевању!

1 Стручно-биографски подаци

Паси Хуовинен је рођен 1967. године у Варкаусу у Финској. По завршетку средње школе, у јесен 1986. године уписао се на Универзитет Јиваскила као студент физике, а дипломирао у јуну 1996. године. Током дипломских студија паралелно је радио истраживање у групи проф. Весе Русканена, под чијим менторством је наставио и докторске студије на тематици динамичког моделовања флуида креираног у сударима тешких јона. Докторску дисертацију из физике, под називом „Ограничења хадроновог спектра термичке електромагнетне емисије у сударима тешких јона у CERN SPS“ ("Constraints from Hadron Spectra on Thermal Electromagnetic Emission in Heavy-Ion Collisions at the CERN SPS"), је одбранио у јуну 1999.

Од тада је радио као истраживач на неколико универзитета и истраживачких института у САД-у и Европи. Његова прва постдокторска позиција била је у Националној лабораторији Лоренс Беркели у Калифорнији, од јесени 1999. до јесени 2001. Затим је уследио постдок на Универзитету Минесота, у Минеаполису до јесени 2003. После четири године проведене у САД, вратио се у Финску на истраживачку позицију на Универзитету Јиваскила на једну и по годину. Од априла 2005. до септембра 2007. био је гостујући научни сарадник на Универзитету Вирџнија, у Шарлотсвилу, САД, да би затим наставио као истраживач на Универзитету Пурду у САД. Почетком 2009. године се враћа у Европу као истраживач на Гетеовом универзитету у Франкфурту на Мајни, Немачка. У Франкфурту је боравио до јесени 2015. године, а током тог времена је био и истраживач на Франкфуртском институту за напредне студије (ФИАС). Од новембра 2015. до октобра 2019. био је ванредни професор на Универзитету у Вроцлову. Током тог периода, добио је грант Националног научног центра у Пољској за пројекат ``Disipative properties of strongly interacting matter formed in heavy-ion collisions‘‘ (Polonez grant 2015/19/P/ST2/03333). По завршетку овог пројекта придружио се Институту за физику у Земуну. Ангажован је као члан ЕРЦ пројекта “A novel Quark-Gluon Plasma tomography tool: from jet quenching to exploring the extreme medium properties”, Horizon 2020, ERC-2016-COG: 725741. На овом пројекту др Хуовинен је задужен за динамичке симулације кварк-глуонске плазме.

2 Анализа научне активности

Dr. Pasi Huovinen is a specialist in fluid-dynamical modeling of ultrarelativistic heavy-ion collisions. The goal of heavy-ion physics is the study of a new state of matter, so-called quark-gluon plasma, formed in the collisions of heavy nuclei (in practice lead or gold) at ultrarelativistic energies. In ordinary matter the basic building blocks of matter, quarks and gluons are confined to form hadrons, but in deconfined matter, in the previously mentioned quark-gluon plasma, quarks and gluons behave as free, although interacting, particles. The plasma formed in the collisions of heavy ions cannot be directly observed, since its huge temperature and pressure blow it apart immediately after formation. The plasma droplet expands, cools, and forms ordinary hadrons where quarks and gluons are again confined. Thus the existence of the plasma must be deduced from the properties and distributions of the final state hadrons, and fluid-dynamical modeling is an essential part of this process. In a sense, these models are cross disciplinary, since their use and development requires knowledge of numerical calculations, both particle and nuclear physics, thermodynamics and fluid dynamics, all of which Dr. Huovinen has mastered.

In a pair of seminal papers Dr. Huovinen with his collaborators [105,106 in his list of works] showed that the observed anisotropies in the azimuthal momentum distributions of the final state hadrons (in particular so-called elliptic flow) can be reproduced if the matter formed in the collision behaves as (almost) thermalised fluid, but not if the matter behaves as a cloud of particles which rarely rescatter. This result was essential when concluding that quark-gluon plasma was formed in those collisions.

During the last fifteen years Dr. Huovinen has kept refining the collision model, and contributed to the increasing understanding of the properties of quark-gluon plasma. One of his research interests is the equation of state of strongly interacting matter: He found that the data would be easier to reproduce if the deconfinement transition were of first order, not crossover as predicted by lattice QCD [36]. Along with his collaborator he found that the disagreement between a hadron resonance gas (HRG) model EoS and lattice QCD results was due to unphysically large quark masses in lattice QCD calculations [33]. If one used corresponding masses in HRG, the results agreed. Thus it made sense to assume that if one uses hadron resonance gas EoS (with physical masses) at low temperatures, and lattice QCD result at high temperatures, the resulting EoS would be close to the physical one. An assumption vindicated by subsequent lattice QCD calculations. The candidate and his collaborator provided a couple of such EoSs in a parametrised form, which was suitable for fluid dynamical calculations. One of these equations of state, so-called *s95p*, became very popular and was practically the “industry standard” in fluid dynamical modeling around year 2015. In his most recent publication [12] the candidate and his collaborators have updated these parametrisations to agree with the most recent lattice results. The candidate has also applied similar ideas to parametrise the equation of state at finite baryon densities [7,29,32].

As we already mentioned, the equation of state in the hadronic phase is usually based on the hadron resonance gas model. It is a simple but effective model where the effects of interactions between hadrons are described as resonances with well defined masses. Both the experimental data and lattice QCD calculations are now at the level where we are able to see deviations from the simple HRG model. The candidate has began the work of improving the HRG model by describing the effects of pion-pion interactions in terms of phase shifts observed in pion-pion scattering [15], and by including the effect of repulsive interactions between baryons in terms of a repulsive mean field [14].

Once it became clear that the data could be described using ideal fluid dynamics, the question arose how low the specific shear viscosity of quark-gluon plasma actually is. For that purpose ideal fluid dynamics had to be replaced by dissipative fluid dynamics. The candidate contributed to this shift by studying whether dissipative fluid dynamics—which assumes a small deviation from local kinetic equilibrium—is even applicable to heavy-ion collisions [10,25,34]. A comparison to a model based on kinetic theory—which allows arbitrary deviations from equilibrium—showed that if the specific shear viscosity is close to the postulated lower limit, $\eta/s=1/(4\pi)$, dissipative fluid dynamics is applicable.

The candidate has extensively studied what kind of constraints the data provides for the η/s of strongly interacting matter. After exploring the sensitivity of the effective, i.e., temperature independent, η/s to all the other parameters of the model, i.e., all the unknowns, at RHIC [24], and analysing the LHC data [21], the candidate began studying how viscosity depends on temperature and chemical potential. First [9], the candidate found with his collaborators that the anisotropies observed in collisions at RHIC are not sensitive to η/s in QGP, only to its minimum value, and its value in the hadron gas. In collisions at lower LHC energy η/s both in plasma and hadron gas effect the anisotropies. Only in collisions at the full LHC energy is η/s in plasma dominant. Later they elaborated on this discovery by exploring at what temperatures does η/s of the fluid affect the anisotropies in collisions at different energies [19], and how this behaviour depends on rapidity [4]. It turned out that at back- and forward rapidities the fluid behaves like fluid at midrapidity in a lower energy collision. Like temperature, also net-baryon density should affect the specific shear viscosity of the fluid. The candidate and his collaborators modeled collisions at the RHIC Beam Energy Scan energies [2,28] to find out how η/s depends on the net-baryon density. They saw that it is possible that the effective η/s increases with decreasing collision energy and therefore increases with increasing net-baryon density, but uncertainties were unfortunately too large for any quantitative statements.

In his latest publication [12] the candidate continues his project to constrain the temperature dependence of η/s. The candidate and his collaborators applied sophisticated Bayesian analysis to the fluid dynamical description of heavy-ion collisions, and found that once one takes into account the uncertainties of the model, the extracted value of η/s hardly depends on the equation of state used in the analysis—unlike previously claimed in the literature. Furthermore they found that there is a relatively broad temperature region around T_c where η/s hardly depends on temperature.

One of the significant problems in fluid dynamical modeling of heavy-ion collisions is that we do not know what the initial state of the fluid dynamical expansion is. In other words, what the boundary conditions for the partial differential equations governing the expansion are. The candidate and his collaborators found a rule which remarkably simplifies this problem (this rule was independently discovered by other authors roughly at the same time). If one observes not only the average anisotropy in collisions, but their event-by-event distribution, and scales the distribution by its average, it is similar to the event-by-event distribution of the spatial anisotropy of initial states used to model the collisions, independently of the properties of the fluid [5,30]. Thus one needs only to evaluate the spatial anisotropy distribution of an initial state model, and compare it to the experimentally observed anisotropy distribution. If it does not agree, the model is not good enough—no fluid dynamical calculations needed. Of course this does not mean fluid dynamical modeling is unnecessary—if the distributions agree, we may use this initial state model, and use fluid dynamics to learn about the properties of the QGP formed in the collisions.

One of the conceptual problems of fluid dynamical modeling is so-called freeze-out; the stage when fluid dynamics ceases to be valid, and the system begins to behave as free streaming particles instead. The usual approximation is to take the freeze-out to happen when/where the system reaches a fixed freeze-out temperature. The candidate studied with his collaborators whether more physical assumption of freeze-out when/where the expansion rate of the system exceeds the scattering rate of particles would change the results [16]. It turned out that it made hardly any difference, but the same topic was further explored in [4] with similar results. Paper [18] is also related to freeze-out, as a technical discussion of the more general topic of particlization, the change from fluid dynamical degrees of freedom to particle degrees of freedom (the word 'particlization' is candidate's contribution to the terminology of heavy-ion collisions). In [18] the candidate presented an algorithm for finding the three dimensional particlization or freeze-out hypersurface, and its normal vector, in four-dimensional space. In the second part of the same publication, his collaborator provided a sampling algorithm to convert fluid to particle ensembles at such a hypersurface. This paper led also to publication [3] where the candidate studied so-called negative Cooper-Frye contributions with his collaborators, with the result that at large collision energies these contributions are not significant, but they may cause significant uncertainties at low energies.

As a member of the present ERC project, the candidate has also extended his research to high-p_T particles, and participated in showing [13,26] that the initial shape of the collision system can be obtained from the distributions of high-p_T particles, providing further constraints to the models describing the initial state of fluid-dynamical evolution.

Overall, the candidate's works demonstrate significant contribution to heavy-ion physics, and an ability to both collaborate with colleagues with various backgrounds and research independently.

3 Елементи за квалитативну анализу рада кандидата

3.1. Квалитет научних резултата

3.1.1. Научни ниво и значај резултата

During the last fifteen years Dr. Pasi Huovinen has published 37 scientific papers in peer-reviewed international journals. Eleven of these papers belong to category M21a, 14 to M21, 11 to M22 and one to category M23. The total impact factor of these works is 127.857. In addition, in that period, Dr. Huovinen has been one of the authors in 57 talks in international workshops and conferences. Twenty two of these were by invitation.

In chronological order, the five most significant works of Dr. Huovinen during the last fifteen years are:

1. Pasi Huovinen and Denes Molnar,
   ``The Applicability of causal dissipative hydrodynamics to relativistic heavy ion collisions,''
   Phys. Rev. C79, 014906 (2009); doi:10.1103/PhysRevC.79.014906
   (IF 2009: 3.477, SNIP: 1.88, 106/110/107 citations)
2. Pasi Huovinen and Peter Petreczky,
   ``QCD Equation of State and Hadron Resonance Gas,''
   Nucl. Phys. A 837, 26-53 (2010); doi:10.1016/j.nuclphysa.2010.02.015
   (IF 2010: 1.986, SNIP: 0.83, 357/352/334 citations)
3. Harri Niemi, Gabriel S. Denicol, Pasi Huovinen, Etele Molnar and Dirk H. Rishcke, ``Influence of the shear viscosity of the quark-gluon plasma on elliptic flow in ultrarelativistic heavy-ion collisions,”
   Phys. Rev. Lett. 106, 212302 (2011); doi:10.1103/PhysRevLett.106.212302
   (IF 2010: 7.622, SNIP: 2.89, 179/178/150 citations)
4. Harri Niemi, Gabriel S. Denicol, Hannu Holopainen and Pasi Huovinen,
   ``Event-by-event distributions of azimuthal asymmetries in ultrarelativistic heavy-ion collisions,''
   Phys. Rev. C87, 054901 (2013); doi:10.1103/PhysRevC.87.054901
   (IF 2013: 3.881, SNIP: 1.89, 141/144/133 citations)
5. Jussi Auvinen, Kari J. Eskola, Pasi Huovinen, Harri Niemi, Risto Paatelainen and Peter Petreczky,
   ``Temperature dependence of eta/s of strongly interacting matter: effects of the equation of state and the parametric form of (eta/s)(T),''
   Phys. Rev. C102, 044911 (2020); doi:10.1103/PhysRevC.102.044911
   (IF 2017: 3.304, SNIP: 1.26, 0 citations)

One of the typical candidate‘s works, the first paper is a collaboration of specialists of two different subfields, Prof. Molnar being a specialist in kinetic theory. In this paper the candidate and his collaborator compared dissipative fluid dynamics and transport theory in detail, and showed that if shear viscosity coefficient over entropy density ratio, η/s, is very low, fluid dynamics is an applicable description of heavy-ion collisions. The reports of the quark-gluon plasma formed in these collisions being the most perfect fluid ever observed were just emerging at that time, and the candidate's results were essential in confirming that these reports were reliable, and not results of using fluid dynamics outside of its realm of applicability.

In the second paper the candicate teamed up with Dr. Petreczky, a specialist in lattice QCD calculations. At the time of writing of that paper, the lattice QCD calculations of the equation of state of strongly interacting matter were hampered by large discretization errors, and inability to carry out calculations using physical quark masses. Thus, the lattice QCD equation of state was reliable only at large temperatures. The unphysically large quark masses lead to too heavy pions, and the authors showed that if one evaluates so-called Hadron Resonance Gas equation of state using these unphysically large pion masses, the result agreed with the lattice QCD results. Thus they postulated that a reasonable approximation of the physical equation of state can be obtained using Hadron Resonance Gas model (with physical particle properties) at low temperatures, lattice QCD result at large temperatures, and connecting these regions smoothly. Later lattice QCD calculations showed that this postulate had been correct. The authors provided a set of parametrised equations of state to be used in fluid dynamical calculations, which became immensely popular. As a result, the focus of fluid dynamical modeling of heavy-ion collisions shifted from studying the equation of state of strongly interacting matter to attempts to constrain its transport properties.

Unlike of the first two papers, the authors of the third and fourth paper are all specialists in fluid dynamics, who all had their appointments at the Goethe University in Frankfurt at that time. After it was established that quark-gluon plasma has very low specific shear viscosity η/s, a question arose how it depends on temperature. In the third paper the authors found that in collisions at RHIC, the viscosity of hadron gas actually dominates over viscosity in plasma, which hardly affects any final observable. Only at the full LHC energy the viscosity of plasma does dominate. This means that extracting the temperature dependence of η/s is very complicated, but on the other hand, collisions at different energies clearly probe the properties of strongly interacting matter at different temperatures.

In the fourth paper the authors found that, if scaled by their average values, the event-by-event distributions of the observed momentum anisotropies of the final state particles, and the event-by-event distributions of the anisotropies of the initial state, are identical, no matter what the properties of the fluid (equation of state, transport properties) are. This was a seminal discovery, since one of the problems of fluid dynamical modeling is that the initial state of the fluid dynamical expansion is unknown. There are various models to evaluate it, but their valdity had to be tested by carrying out the whole fluid dynamical calculation, and comparting to the data. Furthermore, when applied to the calculations, they all lead to slightly different transport properties of the fluid. The result of this paper provided a strong new constraint to the initial state models – it is sufficient to evaluate the event-by-event distribution of anisotropies given by an initial state model, compare to the event-by-event anisotropy data, and proceed only if they agree. This helped to significantly constrain the state-of-the-art models for calculating the initial state, and therefore reduced the uncertainty in the extracted transport properties of quark-gluon plasma.

In the fifth paper the candidate and his collaborators returned to the topics of parametrised lattice QCD equation of state, and temperature dependence of η/s. The authors carried out a sophisticated Bayesian analysis of the data and the results of fluid dynamical modeling. The advantage of such modeling is that it provides not only favoured values of parameters, but also statisically meaningful credibility ranges to those values. The authors provided new parametrisations of the equation of state and showed that even if the favoured values of η/s depend on the equation of state, the difference is smaller than the inherent uncertainty of those results. Thus, all the works in the literature based on by now outdated lattice results are still valid. Furthermore, the authors explored how the assumed parametric form affects the temperature dependence of η/s, and found that their parametrisation lead to slightly larger minimum value of η/s than in previous Bayesian analyses (with overlapping credibility ranges). This emphasised the statistical nature of the Bayesian analysis and importance of the credibility ranges.

3.1.2. Цитираност

According to the Web of Science database, the candiate‘s works written since November 2005 have been cited 2229 times, according to the Scopus database 2235 times excluding author‘s own citations, and 1967 times if the self-citations by all authors have been excluded. This is a significant number demonstrating the candidate‘s contribution to the field, and his recognition among his peers. According to the same databases, the candidate‘s h-index for these publications is 23/23/22 (Web of Scienece/Scopus excludind autocitations/Scopus excluding autocitations by all authors). His h-index for his entire career is 31/30/30.

He is included in the World's Top 2% Scientists by Stanford University study.

3.1.3. Параметри и квалитет часописа

During the last 15 years the candidate has published 37 papers in international journals. Of these, 11 belong to category M21a, 14 are category M21, 11 are in M22 and one is in category M23 (invited review). All the journals are highly esteemed in the field of ultrarelativistic heavy-ion physics. The total impact factor of these works is 127.857.

Подаци о додатним библиометријским параметрима радова су дати у следећој табели:

M21, M22, M23	ИФ	М	СНИП
Укупно	127.857	280	54.73
Усредњено по чланку	3.456	7.568	1.50
Усредњено по аутору	43.576	95.570	18.47

3.1.4. Степен самосталности и степен учешћа у реализацији радова у научним центрима у земљи и иностранству

In large collaborations like many of the candidate's works, it is difficult to pinpoint the main author, and thus it is commonplace for authors to sign in alphabetical order. For example his latest publication was initiated by the candidate, the lattice QCD results were provided by Dr. Petreczky, parametrised by the candidate, the initial state calculation was by Prof. Eskola and Dr. Paatelainen, the fluid-dynamical calculations were carried out by Dr. Niemi, the Bayesian analysis by Dr. Auvinen, and the final paper was largely written by the candidate. In a similar fashion the candtate has provided crucial inputs to all of his works.

In his scientific work Dr. Huovinen has concentrated on fluid dynamical description of heavy-ion collsions, and he is considered to be one of the leading experts in the field. His works have a reputation of being thoughtful, original, and devoid of hype. His reputation is manifested in the large number of citations of his works, many collaborators and invitations to talk. In addition, thanks to his expertise in fluid dynamical modeling of heavy-ion collisions, the candidate was hired by Dr. Magdalena Djordjevic for a project funded by a prestigious ERC grant.

3.2 Ангажованост у формирању научних кадрова

As a principal investigator in Wrocław, the candidate was responsible for hiring two graduate students and supervising their work related to the project. However, the candidate could not be their formal supervisor due to the rules of the University of Wrocław.

The candidate has given several well received introductory lectures to fluid dynamical modeling of heavy-ion collisions in various winter and summer schools. During the last decade there was almost one lecture per year.

The candidate has also been engaged in popularising science through well received popular lectures at science festivals in Poland.

3.3 Нормирање броја коауторских радова, патената и техничких решења

The candidate's publications are based on numerical simulations, and are often result of collaborations. Of the 37 publications 33 have five authors or fewer, so they enter with full weight. Two publications have six authors, one seven, and one publication has eight authors.

Taking into account the rules on standardising the number of co-authored works, the candidate has achieved a total of **337.43 points** (346 without standardisation), of which **272.6 points** (280 without standardisation) from the M20 categories. These values are way above the minimum quantitative requirements for election to a Principal research Investigator, which prescribe a total of 140 points, and 70 from the M20 category.

3.4. Руковођење пројектима, потпројектима и пројектним задацима

During his appointment at the University of Wrocław, the candidate was the Principal Investigator of the project „Dissipative properties of strongly interacting matter formed in heavy-ion collisions“ funded by National Science Center (NCN), Poland, with Polonez grant 2015/19/P/ST2. As pricipal investigator, the candidate managed the whole project.

3.5. Активност у научним и научно-стручним друштвима

The candidate has participated in organising four workshops in heavy-ion physics, two in Germany, and two in Italy, and he was the main organiser of one of them.

He is a referee for several international journals, and has received both the APS outstanding referee award, and the Physics Letters B „Outstanding Contribution in Reviewing“ award. He is also a frequent reviewer of project proposals for three funding agencies.

3.6 Утицај научних резултата

The impact of the candidate‘s scientific results was discussed in Section 3.1 through analysis of the significance of the papers, their impact factors and the citation count.

3.7 Конкретан допринос кандидата у реализацији радова у научним центрима у земљи и иностранству

Dr. Pasi Huovinen has contributed significantly to every work in which he has participated, and due to his expertise in fluid dynamical modeling in general and equations of state in particular, these works would not have been completed without him. In the context of fluid dynamical modeling of heavy-ion collisions he has provided important insights in the validity of fluid dynamics, appropriate equation of state, temperature and chemical potential dependencies of shear viscosity coefficient, and technical details of so-called freeze out (or particlization).

The breadth of the candidate‘s international network of collaborators and connections is demonstrated by the large number of co-authors of his papers extending all around the world. He has ongoing projects with Dr. Petreczy (BNL, USA), Prof. Rischke (Frankfurt, Germany), Profs. Redlich and Sasaki (Wrocław, Poland), and Prof. Eskola and Dr. Niemi (Jyväskylä, Finland). He has been employed by several universities and research institutes, and consequently his work has been carried out in many countries.

3.8 Уводна предавања на конференцијама и друга предавања по позиву.

In the period of last fifteen years the candidate has given 22 invited talks, i.e. more often than once a year. Four of these talks were recorded as proceedings, and one of them was a plenary talk at the second International Conference on Particle Physics and Astrophysics (ICPPA 2016). He is a regular invitee to the Exited QCD series of workshops, and has given several talks at workshops organised at Brookhaven National Laboratory and at GSI, Darmstadt. All of this demostrates his significant international visibility.

4 Елементи за квантитативну анализу рада

Остварени бодови:

Категорија	М бодова по раду	Број радова	Укупно М бодова	Нормиран број М бодова
M21a	10	11	110	107.143
M21	8	14	112	109.333
M22	5	11	55	53.125
M23	3	1	3	3.000
M31	3.5	4	14	14.000
M32	1.5	18	27	26.250
M33	1	15	15	14.833
M34	0.5	20	10	9.750

Поређење са минималним квантитативним условима за избор у звање виши научни саветник:

<table>
<tr><td rowspan="4">Критеријуми
за звање
научни саветник</td><td></td><td>неопходно</td><td>остварено</td></tr>
<tr><td>укупно</td><td>140</td><td>346 (337.434 нормирано)</td></tr>
<tr><td>M10+M20+M31+M32+
M33+M41+M42</td><td>100</td><td>336 (327.648 нормирано)</td></tr>
<tr><td>M11+M12+M21+
M22+ M23+M24</td><td>70</td><td>280 (272.601 нормирано)</td></tr>
</table>

Из приложене табеле се види да кандидат вишеструко задовољава квантитативни услов за избор у звање виши научни саветник.

5 Закључак

Резултати др Паси Хуовинена су објављени у великом броју еминентних међународних часописа. У истраживању блиско прати резултате великих експеримената, његова теоријска предвиђања су вишеструко потврђена, и радови цитирани у завидном броју. Значај његових резултата истиче и чињеница да је више пута позиван да представи свој рад на водећим светским конференцијама, као и добијене награде током научноистраживачке каријере. Додатно, уврштен је међу десет најцитиранијих научника у Србији на светској ранг листи научника Станфорд универзитета.

Имајући у виду значајан допринос др Паси Хуовинена области физике тешких јона, велико искуство и углед у овој области, као и остварену значајну међународну сарадњу, мишљења смо да је кандидат достигао високу научну зрелост и истраживачку компетенцију. На основу података из извештаја може се видети да вишеструко задовољава све квалитативне и квантитативне услове Закона о научноистраживачкој делатности Републике Србије за избор у звање научни саветник. Због тога нам је изузетно задовољство да предложимо Научном већу Института за физику у Београду да утврди предлог да се др. Паси Хуовинен изабере у звање научни саветник.

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