Annex 3.

APPROVED

JINR DIRECTOR

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“_____“_________________2024 г.

NA62 PROJECT PROPOSAL FORM

1. General information on the research project

1.1 Theme code / LRIP *02-1-1096-2010*

1.2 Project/LRIP subproject code *02-1-1096-1-2010/2027*

1.3 Laboratory *Veksler and Baldin Laboratory of High Energy Physics*

1.4 Scientific field *Elementary particle physics and Relativistic nuclear physics*

1.5 Title of the project
Rare decay $K^+ \to \pi^+ \nu\nu$ *measurement at CERN SPS (NA62 experiment)*

1.6 Project leader *V. D. Kekelidze*

1.7 Project deputy leader *D.T. Madigozhin*

2 Scientific case and project organization

2.1 Annotation

The project is a continuation of the four stages of the NA62 project implemented at VBLHEP JINR in 2010-2021. The aim of all phases of the project is participation in the NA62 experiment at SPS CERN, which plans to measure the very rare decay $K^+ \to \pi^+ \nu\nu$, that will be a decisive test of the Standard Model (SM) by measuring the V_{td} parameter of the Cabibbo-Kobayashi-Maskawa matrix (CKM) with an accuracy of the order of 10%. The strategy of the NA62 experiment is based on measuring high-energy kaon decays in flight. The large kaon decay flux required for such a measurement allows planning a number of parallel precision measurements for rare kaon decay modes, allowing one to test the applicability of the SM and chiral perturbation theory (ChPT), which provides a low-energy approximation for describing strong interactions. The implementation of the NA62 project will make it possible to make significant progress in understanding the problem of CP violation, accurately measure the characteristics of the ultra-rare decay of a positively charged kaon into a pion and two neutrinos, search for supersymmetric particles and their partners in order to discover physics beyond the Standard Model, and also clarify the parameters of the decays of charged kaons. The JINR group is actively involved in the analysis of experimental data in order to measure the properties of a number of rare decays, and also intends to participate in the collection of new data in the runs of 2024 and 2025. Papers published as a result of this work, with the decisive contribution of the staff of our institute, will become the basis for several candidate dissertations. During the experimental runs, the JINR group will maintain the detectors of the high-resolution magnetic spectrometer, created on the basis of thin-walled drift tubes (straws) operating in vacuum. The development of a new spectrometer detector with small diameter tubes will continue. The technology created in this case for trackers for high-intensity beams will contribute to ensuring JINR's leadership in the field of straw tube-based detectors. NA62 software will be developed for modeling, processing and analysis of accumulated experimental data, also suitable for use in JINR experiments.

2.2 Scientific case

2.2.1 Aim of the project

The goal of the project is to participate in the NA62 experiment at the SPS at CERN, where it is planned to measure the very rare decay of the kaon $K^+ \to \pi^+ \nu\nu$, in order to provide a decisive test of the Standard Model (SM) by measuring the Cabibbo-Kobayashi-Maskawa (CKM) matrix parameter V_{td} with precision of the order of 10%. The project is a continuation of the five stages of the NA62 project, implemented at VBLHEP JINR in 2010-2024.

2.2.2 Relevance and scientific novelty

Using the Wolfenstein notation of CKM, the relationship between the parameters ρ and η may be represented by the unitarity triangle shown in the left part of the Figure 1. The “golden modes” $K^0 \to \pi^0 \nu\nu$ and $K^+ \to \pi^+ \nu\nu$ give an opportunity to make a very sensitive tests of SM, as their probabilities are directly related to η^2 (height of the triangle) and $(\rho - 1.4)^2 + \eta^2$. The SM predictions for these two decay rates have accuracy to 2% and 8% respectively, and in the case if significant deviations from the predictions will be observed, it will undoubtedly be the evidence of the phenomenon beyond the SM.

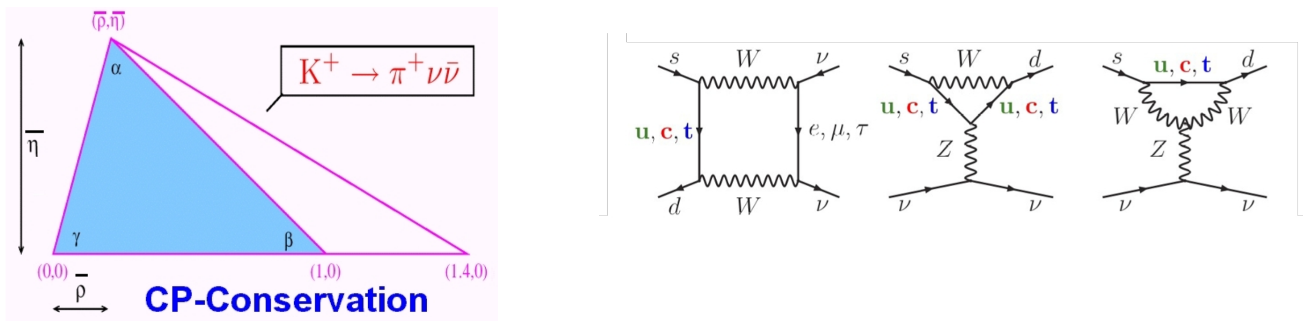

Figure 1. Left: the decay $K^+ \to \pi^+ \nu\nu$ probability defines the length of the right segment of the triangle. Right: Feynman diagrams of the decay within the Standard Model.

The goal of the NA62 experiment, a detailed description of which is given in [1,2,3,4], is to register about 100 $K^+ \to \pi^+ \nu\nu$ decay events and maintain a small systematic error. This would be a significant improvement over the previously available E787 and E949 results [5], based on just 7 gold mode events. For this purpose, at least 2×10^{13} K^+ decays are required, assuming 10% signal acceptance and a relative decay probability of 10^{-10}. Low systematic uncertainty requires a suppression factor for typical kaon decays of the order of 10^{12} and the ability to measure detection efficiency and background suppression factors directly from the data.

The large flux of kaons makes it possible to search for other rare kaon decays and study their characteristics, including testing the existence of superpartners of Goldstone fermions [6-8]. A series of precision measurements can be made on rare kaon decay modes to test the validity of chiral perturbation theory (ChPT). The search for rare decays that are forbidden or suppressed within the SM opens up the possibility of discovering new physics or establishing new limits of applicability of the SM and some of its extensions. It includes the search for light dark matter candidates that can be formed during the decays of rare kaons, including the heavy neutral lepton [9].

Before the NA62 experiment, the most accurate experimental results were obtained in the E787 and E949 experiments at BNL when studying the decays of stopped kaons [5]: BR($K^+ \to \pi^+ \nu\nu$) = $(1.73^{+1.15}_{-1.05}) \times 10^{-10}$. With the exception of the NA62 experiment, no other measurements of this mode are currently being carried out or planned. The existing gap between theoretical precision and large experimental error encourages serious experimental efforts. Significant new constraints can be obtained by measuring the probability of this decay with an accuracy of the order of 10%.

During previous periods of the project, the NA62 experimental facility was built and tested in 2014 on CERN SPS beamlines. JINR and CERN specialists provided construction and installation of track spectrometer detectors designed and built at two stages of the NA62 project, completed earlier at JINR (in 2010–2012 and 2013–2015). After the straw chambers of the spectrometer were installed as part of the experimental detector NA62 in 2014 (Fig. 2), their actual position was measured, vacuum tests of the straw detectors were carried out, and a gas supply system was installed. Four power modules (MPODs) are installed and a control interface for them is developed, integrated into the NA62 slow control system. To design and manufacture the spectrometer, a number of important methodological works were carried out [10-13].

Figure 2. A straw chamber assembled from 2 modules (left) and its installation in the NA62 experimental setup (right).

During the NA62 physics run in 2016, stable data collection was conducted at an intensity of 13×10^{11} protons per pulse on the target used to generate the kaon flux (40% of nominal intensity). The intensity was limited by the temporal structure of the beam, resulting in maximum beam intensity values that were much higher than expected. As a result, the internal electronics of some detectors were unable to process data at intensity peaks. After updating the electronics firmware for the NA62 sessions in 2017-2018, data collection was carried out at 60% of the nominal intensity. Another important reason for the reduced statistical significance of the currently achieved NA62 result is the size of unexpected background from the incoming beam, which was further suppressed by additional shielding and better kaon parameters measurement.

Radiation protection was improved prior to the collection of data for 2018. The electronics racks for the KTAG, CHANTI and GTK cooling stations were equipped with additional concrete blocks. Neutron protection (boron carbide) has been added to the KTAG electronics racks. To reduce the background from the beam, which affects the analysis of $K^+ \to \pi^+ \nu\nu$, the beam transmission scheme in front of the decay volume was changed. The main modifications are: optimized achromat layout, 4th GTK station and a new veto counter system around the beam tube. A thorough examination of the sources of inefficiency in the entire TDAQ system was conducted using all available recorded information. Since April 2019, additional efforts have been focused on improving multi-detector calibration procedures, including a new LKr energy calibration using photons from π^0 decays developed by the JINR and Perugia groups.

In 2021, a new NA62 result on measuring the relative probability of the $K^+ \to \pi^+ \nu\nu$ decay, based on data collected in 2016-2018, was published [14,15,16]. Single event sensitivity is found to be

$(0.839 \pm 0.054) \times 10^{-11}$, that corresponds to 10 events expected within SM. The measurement is based on 20 selected candidates with an expected background of 7 events, which corresponds to the observation of this rare decay with a statistical significance of 3.4 σ. This led to the most accurate measurement of the probability of decay to date $BR(K^+ \to \pi^+ \nu\nu) = (10.6^{+4.0}_{-3.4} \pm 0.9syst) \times 10^{-11}$ at 68% CL, which is consistent with the expectation of the Standard Model $(8.4 \pm 0.1)\times 10^{-11}$. Fig. 3 shows 17 candidates from 2018 data which constitute approximately 80% of the complete 2016-2018 data set, rectangles show the signal area that was closed until the end of the analysis.

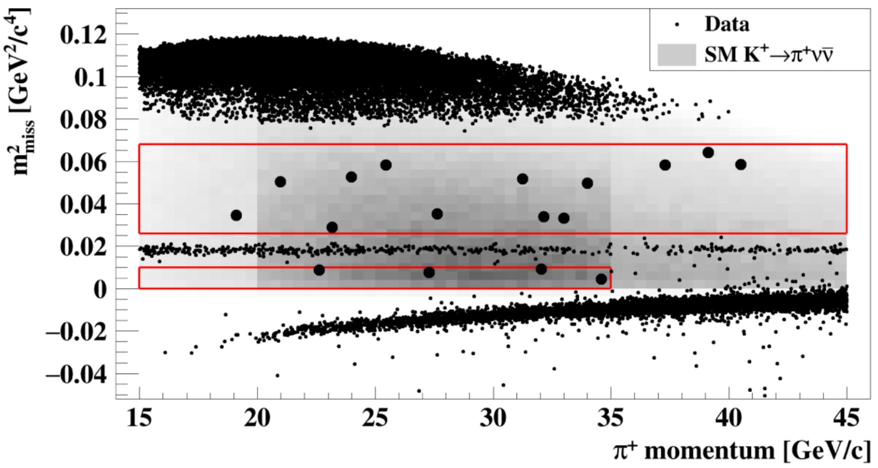

Figure 3. Missing mass squared vs pion momentum for the $K^+ \to \pi^+ \nu\nu$ decay 17 candidates selected from the NA62 data collected in 2018.

JINR's contribution to both completed and ongoing activities of NA62 is very significant. In particular, from the very beginning of the project, the JINR group, together with CERN, was responsible for the creation and operation of the key detector - the NA62 spectrometer (STRAW tracker). JINR's contribution to the creation of the spectrometer was decisive in many aspects: R&D, modeling at the design stage, choice of straw geometry, design of frames, production of straws (more than 7000 at JINR), assembly of modules. During experimental runs of NA62 in 2016-2024. a member of the JINR group (S. Shkarovsky) was the official expert responsible for the operation of the spectrometer and for the detector control system (DCS).

In October 2019, the NA62 experiment submitted Addendum 1 to the P326 project to the SPSC, proposing to continue the physics program after the LHC Second Long Shutdown (LS2), and received approval.

2.2.3 Methods and approaches

The strategy of the ongoing NA62 experiment is based on the measurement of the high energy K^+ decays in flight. In this case, the kaons production cross section is optimized as a function of the proton energy, and the photons detection is efficient due to their high energies in the laboratory system.

NA62 experimental setup (Figure 4) includes the following detector systems:

- **CEDAR** identifies the K^+ component in the beam with respect to the other beam particles by employing an upgraded differential Čerenkov counter.

- Gigatracker **(GTK)** consists of three Si micro-pixel stations measuring time, direction and momentum of the beam particles.

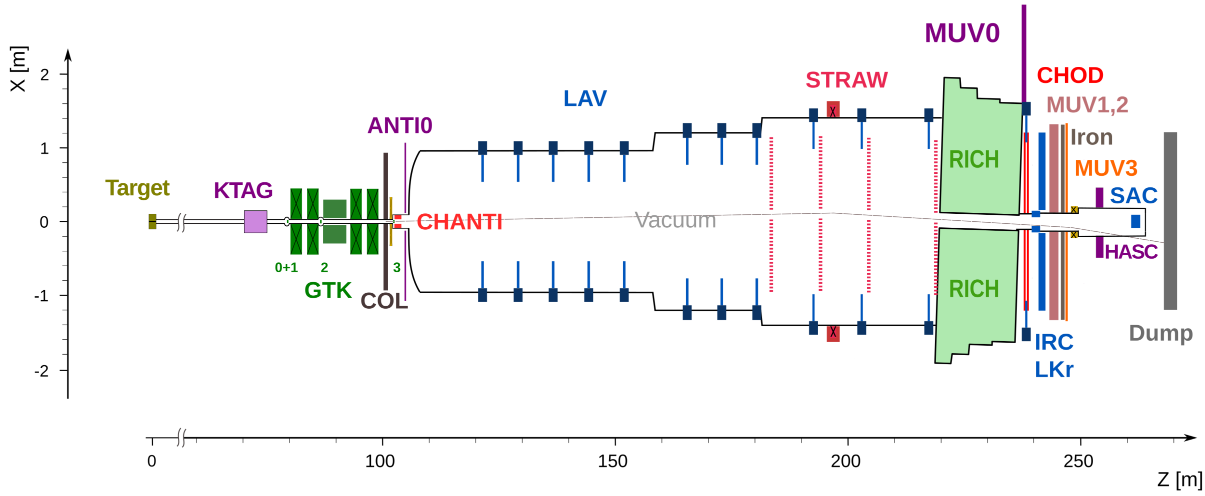

Figure 4. Schematic view of the NA62 experimental setup.

- **STRAW tracker** consists of 4 straw chambers. It measures the coordinates and momentum of secondary charged particles originating from the decay region. In order to minimize multiple scattering the chambers are built of ultra-light material and are installed inside the vacuum tank. The four Straw chambers are arranged around a large aperture dipole magnet (MNP33, black at the scheme), providing a vertical B-field of 0.36 T.

- **RICH detector** consists of 17m long radiator filled with Neon gas at 1 atm. allowing the separation of pions and muons between 15 and 35 GeV/c.

- A system of Photon-Veto detectors provides hermetic coverage of the decay region from zero to large (~50 mrad) angles. This is assured by: the high-resolution Liquid Krypton electromagnetic calorimeter (**Lkr**), the Intermediate Ring (**IRC**) and Small-Angle (**SAC**) Calorimeters and a series of 12 annular photon-veto (**LAV**) detectors.

- The Muon-Veto detectors (**MUV**) are composed of the two-part hadron calorimeter followed by the additional layer of iron and the transversally segmented hodoscope. This system provides redundancy in the detection of muons.

These detectors are complemented by “guard-ring” counters (**CHANTI**) surrounding the last GTK station, and the charged-particle hodoscope (**CHOD**), covering the acceptance and located between the RICH and the LKr. Additional **ANTI0** and **HASC** veto counters make it possible to reduce the background from interactions in the beam and from some rare decays. All the detectors are operated and inter-connected with a high-performance **trigger** and **data-acquisition** (**TDAQ**) system.

Experimental research methods are based on the NA62 technique for studying the decay of a charged kaon on the fly, which is based on measuring the products of kaon decay, as well as identifying and recording the momentum of the incident kaon. Fundamental kinematic relationships are used to evaluate event characteristics, and statistical interpretation of measurement results relies on established mathematical tools and tested software. The experimental setup NA62 described above was built at previous stages of the project, and in the future the JINR group is only expected to maintain it, calibrate it, and also participate in methodological studies with the aim of developing a tracker for higher beam intensities.

Data analysis for the main objective of the experiment is based on precision measurements of tracks of charged particles and the high efficiency of all other detectors used to identify these particles and veto the presence of any other decay products except the undetectable neutrino. Therefore, the good characteristics and stable operation of the magnetic spectrometer, created with the decisive participation of JINR, constitute one of the key contributions to achieving any physical result of the NA62 collaboration.

The distribution of the squared missing mass for K^+ and a positively charged track is analyzed under the assumption that the track is created by a charged pion. The missing mass distribution for the $K^+ \to \pi^+ \nu\nu$ decay is shown in the left diagram of Figure 5. Regions of the NA62 signal are selected based on resolution (region I and region II). The left diagram shows a background that can be separated using kinematics, while the right diagram shows a kinematically inseparable background that is suppressed using additional cuts.

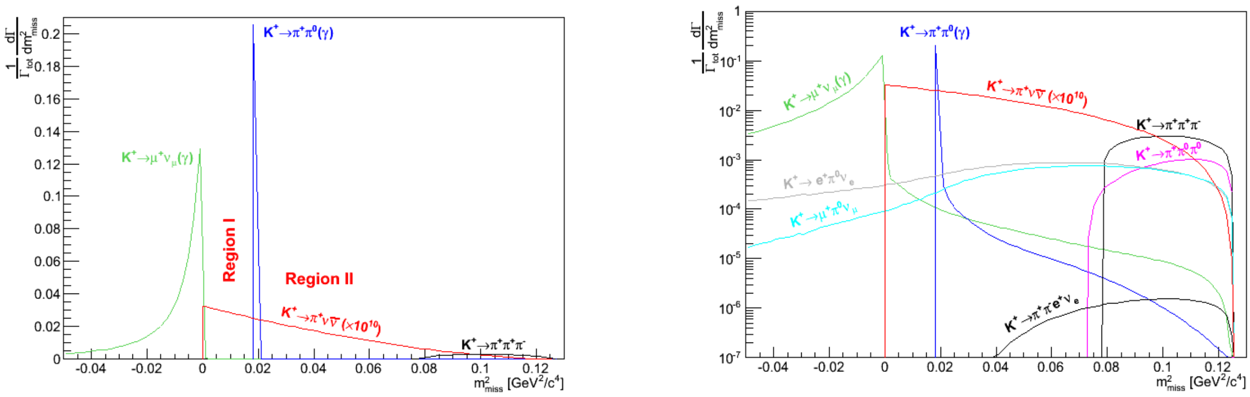

Figure 5. Missing mass distribution $m^2_{miss} = (P_K - P_{track})^2$ for the signal (red line) and background events. Background modes that can be separated from the signal by kinematics are shown in the left plot, and non-separable background modes are shown in the right plot.

There are also K^+ decay modes (with probability > 10^{-5}), for example, K_{e4} ($K^+ \to \pi^+\pi^- e^+\nu$), which can have a topology similar to the decay under study in cases where both the negatively charged pion and the charged lepton are not detected. Therefore, the detector must be hermetic against negatively charged particles. This is also ensured by the geometry of the tracker cameras.

The research activities proposed as part of the extension of the NA62 project at JINR will be focused on achieving the ultimate goal of the current NA62 experiment - measuring the relative probability of the decay $K^+ \to \pi^+\nu\nu$ with an accuracy of the order of 10%. JINR contribution to this result already includes participation in the creation and maintenance of the spectrometer. At the analysis stage, the JINR group takes part in the calibration of the detector and the development of general software.

The analysis of $K^+ \to \pi^+\nu\nu$ decay continues to improve and has already reached a very advanced state. It has been optimized for high beam intensity operation through a number of improvements. Thus, the use of an additional fourth GTK station increased the efficiency of reconstruction of charged kaons by approximately 3%. Additional veto counters in front of the decay volume reduce the background from decays and interactions in the beam line. The new event reconstruction algorithm in LKr has reduced the likelihood of an accidental photon veto. Event selection criteria have been revised and optimized. The decay volume for vertex reconstruction has been re-optimized with increased signal acceptance and reduced background.

Signal acceptance has increased compared to the analysis of data from 2016-2018 as a result of an improvement in selection acceptance by at least 20% with the same level of random veto probability (about 65%), despite an increase in beam intensity. Signal acquisition performance is shown in Figure 6, which compares the published analysis of 2018 data [15] and the current analysis of 2022 data. The average intensity increased from 400 MHz in 2018 to 580 MHz in 2022, but improvements in selection have improved signal detection efficiency.

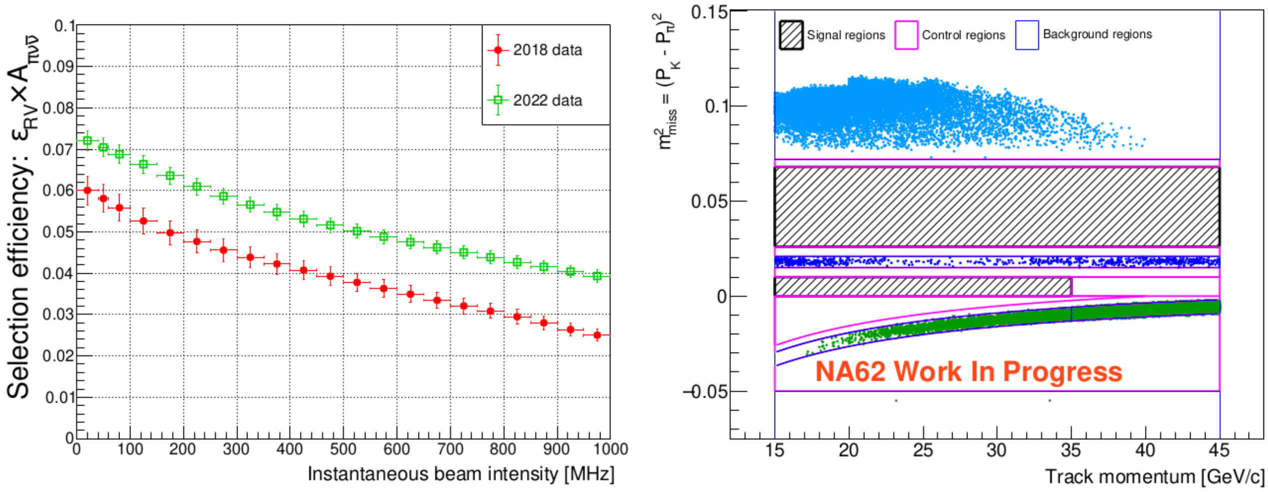

Figure 6. Left: Comparison of selection efficiency, i.e., the product of acceptance and random veto efficiency, as a function of beam intensity for 2018 and 2022 data with the old and new analysis strategies, respectively. Right: Events from the 2022 data that passed signal selection. The signal and control regions remain closed so that only the background regions are displayed, with light blue, dark blue and green dots indicating events in regions dominated by the $K^+ \to \pi^+\pi^+\pi^-$, $K^+ \to \pi^+\pi^0$ and $K^+ \to \mu^+\nu$, respectively.

In addition to analyzing the fundamental mode $K^+ \to \pi^+\nu\nu$, the NA62 collaboration is investigating a number of rare kaon decay modes. The JINR group is involved in the analysis of four-lepton decays $K^+ \to e^+\nu\mu^+\mu^-$, $K^+ \to e^+\nu e^+e^-$, $K^+ \to \mu^+\nu e^+e^-$ and $K^+ \to \mu^+\nu\mu^+\mu^-$ (the latter has not been previously observed) with a relative probability of the order of 10^{-8}. Their precision measurement will expand our knowledge of the parameters of the Chiral Perturbative Theory and verify its validity. The search for forbidden modes $K^+ \to e^-\nu\mu^+\mu^+$, $K^+ \to \mu^-\nu e^+e^+$ will provide a test of the SM limits. The large amount of data and precision measurements of kaon decay products make it possible to measure the form factors of the semileptonic decays K_{e3} and $K_{\mu3}$ at the level of the best previously performed measurements.

The large statistics of kaon decays in NA62 gives us the opportunity to test the prediction of the existence of superpartners of Goldstone fermions - the pseudoscalar sgoldstino P. The HyperCP experiment detected 3 decays $\Sigma \to \pi\mu^+\mu^-$, where the mass of $P \to \mu^+\mu^-$, if it exists, is 214.3 MeV. For NA62, measuring the momentum of the incident K^+ makes it possible to recover the missing mass in $K^+ \to \pi^+\pi^0 P$ decays with undetected pseudoscalar P.

Based on the NA62 data, a search for the production of a heavy neutral lepton (HNL) in the decays of charged kaons is also envisaged. For example, the minimal standard model of neutrinos postulates three HNLs that explain dark matter and the baryon asymmetry of the Universe. The idea of searching for HNL in NA62 is based on studying the distributions of missing masses for $K^+ \to e^+$ and $K^+ \to \mu^+$ with measured momenta of kaons and leptons.

2.2.4 Expected results

Measuring the rare decay of a charged kaon into a pion and two neutrinos with an accuracy of the order of 10%, which will refine the parameters of the Cabibbo-Kobayashi-Maskawa matrix and will be a decisive test of the Standard Model.

Additionally, the probabilities and other parameters of a number of rare decays of charged kaons will be measured, which will make it possible to clarify the parameters of the Chiral Perturbation Theory, which describes strong interactions at low energies. The JINR group plans to complete or approach completion of the analysis of four-lepton decay modes of charged kaons and $K^+ \rightarrow \pi^+\pi^-\mu^+\nu$ decay. The completion of measurements of semileptonic decay form factors from NA62 data and the achievement of an advanced state in the search for light sgoldstino are expected. It is also expected to develop a technology for manufacturing a straw tracker with a tube diameter of 5 mm for high beam intensities.

2.2.5 Risks

Realistic risks we might consider now include the following scenarios:

- Canceling the continuation of NA62 data collection due to the worsening global political situation. Backup strategy for this case: other additional studies of rare kaon decays based on the statistics already collected.
- Exclusion of JINR from the list of collaboration participants by decision of CERN. Backup strategy for this case: participation in the experiment of individual JINR employees in the status that will be permissible in the current circumstances, with a reduction in the actual current costs of JINR, but while maintaining the authorship of JINR employees in NA62 publications.
- Lack of personnel to quickly complete all additional studies. Backup strategy: additional involvement of participants or completion of the analysis later, in parallel with other stages of the project or with other projects.

References

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2.3 Estimated completion date ***2025-2027.***

2.4 Participating JINR laboratories

Veksler and Baldin Laboratory of High Energy Physics

2.4.1 MICC resource requirements

Computing resources	**Distribution by year**				
	1st year	2nd year	3rd year	4th year	5th year
Data storage (TB) - EOS - Tapes					
Tier 1 (CPU core hours)					
Tier 2 (CPU core hours)					
SC Govorun (CPU core hours) - CPU - GPU					
Clouds (CPU cores)					

2.5. Participating countries, scientific and educational organizations

Organization	**Country**	**City**	**Participants**	**Type of agreement**
Centre de Physique de Particules de Marseille	France	Marseille	M. Perrin-Terrin	MoU CERN
Charles University	Czech Republic	Prague	K. Kampf + 7	MoU CERN
Comenius University	Slovakia	Bratislava	T. Blazek + 6	MoU CERN
Ecole Polytechnique	Switzerland	Lausanne	R.I. Marchevski + 4	MoU CERN

Federale Lausanne				
European Organiz. for Nuclear Res. (CERN)	Switzerland	Geneva	A. Ceccucci + 31	MoU CERN
George Mason University	USA	Fairfax	P.D. Rubin + 3	MoU CERN
Horia Hulubei National Institute of Physics and Nuclear Engineering	Romania	Bucharest	A.M. Bragadireanu+4	MoU CERN
INFN Sezione di Pisa, Universita' e Scuola Normale Superiore	Italy	Pisa	M.S. Sozzi +15	MoU CERN
Institute for High Energy Physics of NRC Kurchatov Institute	Russia	Protvino	V. Obraztsov + 15	MoU CERN
Institute for Nuclear Research	Russia	Moscow	Y. Kudenko + 7	MoU CERN
Institute of Nuclear Physics	Kazakhstan	Almaty	Y. Kambar + 5	MoU CERN
Instituto de Fisica	Mexico	San Luis Potosi	J. Engelfried + 5	MoU CERN
Johannes Gutenberg Universitaet	Germany	Mainz	R. Wanke + 10	MoU CERN
Laboratori Nazionali di Frascati	Italy	Frascati	A. Antonelli + 15	MoU CERN
Max-Planck-Institut fur Physik	Germany	Munich	B. Dobrich + 5	MoU CERN
Lancaster University	United Kingdom	Lancaster	R. Jones + 5	MoU CERN
University of Bristol	United Kingdom	Bristol	Helen F. Heath	MoU CERN
Sezione di Roma I (INFN)	Italy	Rome	M. Raggi + 13	MoU CERN
Sezione di Roma Tor Vergata INFN	Italy	Rome	R. Ammendola + 5	MoU CERN
SLAC National Accelerator Laboratory	USA	Menlo Park	D. Coward	MoU CERN
TRIUMF	Canada	Vancouver	D.A. Bryman + 4	MoU CERN
Universita degli studi di Ferrara	Italy	Ferrara	A. Gianoli + 21	MoU CERN
Universita e INFN, Firenze	Italy	Firenze	F. Bucci + 10	MoU CERN
Universita e INFN, Perugia	Italy	Perugia	M. Pepe + 11	MoU CERN
Universita e INFN Torino	Italy	Torino	C. Biino + 12	MoU CERN
Universita Federico II e INFN Sezione di Napoli	Italy	Naples	F. Ambrosino + 11	MoU CERN
Universite Catholique de Louvain (UCL)	Belgium	Louvain	E.C. Gil + 4	MoU CERN
University of Birmingham	United Kingdom	Birmingham	C. Lazzeroni +13	MoU CERN
University of British Columbia	Canada	Vancouver	D. A. Bryman	MoU CERN
University of Glasgow	United Kingdom	Glasgow	D. Britton + 3	MoU CERN

2.6. Key partners

CERN, Switzerland, Geneva.

3. Manpower

3.1. Manpower needs in the first year of implementation

№№ n/a	Category of personnel	JINR staff, amount of FTE	JINR Associated Personnel, amount of FTE
1.	research scientists	10.4	0
2.	engineers	0.7	0
3.	specialists	0.5	0
4.	office workers	0	0
5.	technicians	0	0
	Total:	**11.6**	**0**

3.2. Available manpower

3.2.1. JINR staff

No.	Category of personnel	Full name	Division	Position	Amount of FTE
1.	research scientists	D. Baigarashev	VBLHEP	Junior Researcher	1.0
		A. Baeva	VBLHEP	Junior Researcher	1.0
		S. Gevorgyan	VBLHEP	Leading Researcher	1.0
		E. Goudzovski	VBLHEP	Researcher	0.1
		D. Emelyanov	VBLHEP	Junior Researcher	1.0
		T. Enik	VBLHEP	Head of group	0.3
		V. Kekelidze	Directorate	JINR Vice Director	0.1
		D. Kereibay	VBLHEP	Junior Researcher	1.0
		A. Korotkova	VBLHEP	Researcher	0.7
		D. Madigozhin	VBLHEP	Head of sector	1.0
		N. Molokanova	VBLHEP	Senior Researcher	0.9
		I. Polenkevich	VBLHEP	Senior Researcher	1.0
		K. Salamatin	VBLHEP	Researcher	0.3
		S. Shkarovsky	VBLHEP	Senior Researcher	1.0
2.	engineers	V. Falaleev	VBLHEP	Senior Engineer	0.2

		V. Bautin	VBLHEP	Engineer	0.3
		Y. Kambar	VBLHEP	Engineer	0.3
3.	specialists	V. Gorbunova	VBLHEP	Specialist	0.5
4.	technicians	-			
	Total:				**11.6**

3.2.2. JINR associated personnel

No.	Category of personnel	Partner organization	Amount of FTE
1.	research scientists		0
2.	engineers		0
3.	specialists		0
4.	technicians		0
	Total:		**0**

4. Financing

4.1 Total estimated cost of the project
The total cost estimate of the project (for the whole period, excluding salary)
505 thousands of US dollars.

The details are given in a separate table below.

4.2 Extra funding sources
Expected funding from partners/customers – **0**.

Project Leader __________/V.D.Kekelidze/

Date of submission of the project (LRIP subproject) to the Chief Scientific Secretary: __________
Date of decision of the laboratory's STC: __________ document number: __________

Year of the project start: 2010

(for extended projects) – Project start year: 2025

Proposed schedule and resource request for the Project

Expenditures, resources, funding sources			Cost (thousands of US dollars)/ Resource requirements	Cost/Resources, distribution by years				
				1st year	2nd year	3rd year	4th year	5th year
		International cooperation	340	115 +35	60 +35	60 +35		
		Materials	135	45	45	45		
		Equipment, Third-party company services						
		Commissioning						
		R&D contracts with other research organizations	30	10	10	10		
		Software purchasing						
		Design/construction						
		Service costs (*planned in case of direct project affiliation)*						
Resources required	**Standard hours**	Resources						
		- the amount of FTE,						
		- accelerator/installation,						
		- reactor,…						
Sources of funding	**JINR Budget**	JINR budget *(budget items)*						
	Extra fudning (supplementary estimates)	Contributions by partners Funds under contracts with customers Other sources of funding						

Project Leader __________ /V.D. Kekelidze/

Laboratory Economist __________ /_________________/

APPROVAL SHEET FOR THE PROJECT

Rare decay $K^+ \to \pi^+ \nu\nu$ measurement at CERN SPS (NA62 experiment)

SHORT DESIGNATION OF THE PROJECT **NA62**

PROJECT CODE ***02-1-1096-1-2010/2027***

THEME CODE ***02-1-1096-2010***

NAME OF THE PROJECT LEADER **Kekelidze Vladimir Dmitrievich**

AGREED

JINR VICE-DIRECTOR	SIGNATURE	NAME	DATE
CHIEF SCIENTIFIC SECRETARY	SIGNATURE	NAME	DATE
CHIEF ENGINEER	SIGNATURE	NAME	DATE
LABORATORY DIRECTOR	SIGNATURE	NAME	DATE
CHIEF LABORATORY ENGINEER	SIGNATURE	NAME	DATE
LABORATORY SCIENTIFIC SECRETARY	SIGNATURE	NAME	DATE
THEME LEADER	SIGNATURE	NAME	DATE
PROJECT LEADER	SIGNATURE	NAME	DATE

APPROVED BY THE PAC	SIGNATURE	NAME	DATE