Addendum 2

to the "Update of the HADES Memorandum Of Understanding for the execution of the HADES experiment during FAIR Phase-0"

Between

GSI Helmholtzzentrum für Schwerionenforschung GmbH (GSI) Darmstadt, GERMANY

hereafter referred to as the „Host",

on the one hand,

and

- Laboratorio de Instrumentacao e Fisica Experimental de Particulas (LIP), Coimbra, PORTUGAL
- AGH University of Krakow, Faculty of Physics and Applied Computer Science, Cracow, POLAND*
- Institute of Nuclear Physics, Polish Academy of Sciences, Cracow, POLAND
- Jagiellonian University, Smoluchowski Institute of Physics, Cracow, POLAND
- University of Warsaw - Faculty of Physics, Warsaw, POLAND
- Warsaw University of Technology, Warsaw, POLAND*
- **GSI Helmholtzzentrum für Schwerionenforschung GmbH (GSI) Darmstadt, GERMANY**
- Institut für Kernphysik, Technische Universität Darmstadt, Darmstadt, GERMANY
- Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Inst. für Strahlenphysik, Dresden, GERMANY
- Johann-Wolfgang Goethe Universität, Institut für Kernphysik, Frankfurt, GERMANY
- Technische Universität München, Excellence Cluster Universe, Garching, GERMANY
- Justus-Liebig Universität, II Phys. Inst., Giessen, GERMANY
- Ruhr University Bochum, Bochum, GERMANY
- Frederick University, Nicosia, CYPRUS
- Institut National de Physique Nucleaire et de Physique des Particules du Centre National de la Recherche Scientifique (IN2P3/CNRS) acting for and on behalf of Laboratoire de Physique des 2 infinis Irène Joliot-Curie (IJCLab), Orsay, FRANCE
- Nuclear Physics Institute (NPI), Czech Academy of Sciences, Rez, CZECH REPUBLIC
- Universidade de Santiago de Compostela, Dep. de Fisica de Particulas, Santiago de Compostela, SPAIN
- Department of Physics, Bergische Universität Wuppertal (BUW), Wuppertal, GERMANY

on the other hand,

hereafter individually and collectively referred to as the "Party" or the "Parties" respectively, including the "Host".

* AGH University of Science and Technology and Warsaw University of Technology are new members of the HADES collaboration, which agree to the regulations of the MoU by signing this Addendum.

Extension of the duration of the MoU

The parties agree that the duration of the MoU for the HADES experiment, concluded in 1999 and updated in 2012 and 2018, is extended by a period starting from January 1st, 2023 until the Maintenance & Operation MoU for HADES at FAIR will be signed and become effective.

Each HADES member institute also declares which resources (personpower, contributions to the HADES Common Fund and for the upgrade of the HADES detectors) are planned to be provided in this period.

All other regulations remain unchanged.

Signature pages for the HADES member institute xxxxxx (to be completed and signed)

Intended commitment in the period 2023 - 2030	**Resources**
Participation in data analysis (describe which contribution)	**? [FTE]**
Participation in detector maintenance and commissioning activities (describe which contribution)	**? [FTE]**
Contribution to common fund	**? [EURO/year]**
Contribution to detector upgrades (included in the HADES RRB10/11 cost matrix) (describe which contribution)	**? [EURO]**
Contribution to detector upgrades (not included in the HADES RRB10/11 cost matrix) (describe which contribution)	**? [EURO]**

(date)

(signature and name of Head of Department, Institute, Dean or Director)

1. Regulatory framework of the agreement

1.1. Introduction

HADES has the aim of studying the properties of hadrons in nuclear matter at normal and elevated densities and temperatures. The experimental program includes reactions induced by heavy ions, up to Au+Au as well as pion, proton or deuteron beams. The HADES detector is installed at GSI.

1.2. Purpose of the agreement

The purpose of this agreement is to define the distribution of tasks and responsibilities between the groups. It also defines the financial contribution of each group as agreed upon by the different institutes. The present agreement is an update of the MoU for the Execution of the Experiment HADES dating 29.9.1999 and its subsequent modifications (most recent one on 9.12.2012), which become integral parts of the present agreement. The present version of the MoU reflects in particular aspects of the upgrade and operation of the detector during FAIR Phase-0. It will be replaced as soon as FAIR will request common MoU's from all FAIR collaborations based on General Conditions for Experiments at FAIR.

1.3. Physics programme

The main objective of HADES is to investigate the microscopic properties of resonance matter formed in heavy-ion collisions in the 1-2 AGeV energy regime. Various probes are used for these studies, such as e^+e^- pairs, strangeness, photon and meson production. The program also comprises experiments with proton, deuteron and pion beams to study either cold matter or the structure of hadrons. Analysis activities are organized in Physics Working Groups (PWG) coordinated by the Physics Coordinator, as described in section 2. The priority for upcoming experiments at SIS18 is decided by the Collaboration Board, after public discussion in HADES collaboration meetings.

1.4. Participants

> The Parties of this agreement are listed on the front page of this document. A party is either an institute or a consortium of institutes. The Parties, except for the Host, shall provide the necessary financial support for the participation to the experimental runs including their contribution to the common funds. The amount of these contributions is listed in the institute or consortium pages collected in section 4, where each part also indicates its interest towards the different aspects of the physics program.

HADES can grant associated membership to individuals in cases where her/his host institution is not member of the HADES collaboration. Associate membership is granted upon a positive vote of the Collaboration Board (two-third majority of votes cast). Partial membership provides access to the HADES data and authorship of selected HADES papers, in agreement with the spokesperson.

Access of new parties to the collaboration is welcome, provided it brings new resources in terms of technical contributions or analysis manpower. The formal procedure to be followed, in such a case, shall go through the submission of a detailed request of membership to the HADES Collaboration Board. Membership is granted upon positive vote (two-third majority of CB members entitled to vote).

1.5. Organization of the collaboration

1.5.1. Collaboration Board

This body decides about matters that concern the general policy of the collaboration. It is formed by duly authorized representatives of the Parties. The representatives are decided upon by the member institutions. Only representatives of full members and two representatives of Young Members have voting right and each of them possess one vote. Decisions of the CB shall be taken by reaching a consensus. In case a consensus cannot be reached, the decision shall be taken by voting. 2/3 (two third) of the Parties entitled to vote, present in person or by proxy, shall constitute a quorum. Usual decisions shall require a 2/3 (two third) majority of the votes cast. Decisions concerning the access of new Parties shall be taken by 2/3 majority of the CB members entitled to vote. All documents (reports, list of candidates, etc.) related to decisions should be filed to the CB at least 5 working days in advance. The CB meets regularly at each collaboration meeting. CB board meetings can also be organized on a short notice in cases where important decisions have to be taken urgently, for example, concerning data taking.

The Chairperson is elected among the members of the CB by simple majority. The duration of the mandate is 3 years, with no limitation in the number of recurring nominations.

The CB appoints, in consultation with the GSI management for a period of 3 years a Spokesperson (SP), a Deputy (DE), with no limitation of recurring nominations. Technical Coordinator (TC), Software and Computing Coordinator (SCC) and Physics Coordinator (PC) are appointed by the CB for an indefinite period. Duties of all these roles are defined below. These persons are ex-officio members of the Collaboration Board without voting right. The same goes for the Deputy Technical Coordinator and the Resource Coordinator.

1.5.2. Spokesperson and Deputy

The spokesperson (SP) and the deputy spokesperson (DSP) are elected by the Collaboration Board (CB) by simple majority of votes and for a period of 3 years. They are appointed after consultation with the GSI management. Re-election is possible. The DSP will not be from an institution of the same country as the spokesperson. The SP is responsible for the representation of the collaboration in scientific, technical and managerial concerns and coordinates all efforts of the collaboration. He reports to the CB on all items and prepares all major decisions to be made by the CB. The SP is responsible for the assignment of invited talks at conferences.

The DSP provides support to the SP in the management of the collaboration. In case the SP is not available, the DSP takes over his responsibilities. After consultation of and together with the members of corresponding committees they may take over all relevant decisions which do not allow further delay. Any decision is immediately forwarded to the CB. In particular, SP and DSP will be concerned with all preparations required to have an operating setup according to scheduled time scale. All management decisions are taken in understanding with the Executive Board (XB).

1.5.3. Executive Board (XB)

It shall administrate on a short-term basis (weekly) all actions resulting from decisions taken by the CB. Its role is also to prepare important decisions to be taken by the CB. It is composed of the following office holders: the Spokesperson, the Deputy, the Technical Coordinator, the Operations Coordinator, the Software and Computing Coordinator, the Physics Coordinator and the CB chairperson. The XB has the discretion to invite other individuals on a temporal basis, contingent upon the identification of a potential organizational profit from this measure.

1.5.4. Technical Coordinator

The technical coordinator (TC) is elected by the CB by simple majority of votes and appointed after consultation of the GSI management. The TC monitors the activities of the various project groups to ensure a coherent design of HADES and to resolve potential conflicts arising from incompatible

design decisions within parts of HADES. The TC *only* can authorize any upgrade of HADES. The TC receives and evaluates status reports from each project coordinator. He delivers summary reports to the CB. The TC is assisted by the Operations Coordinator who acts as a deputy. The deputy is proposed by the Technical Coordinator and endorsed by the Collaboration Board.

1.5.5. Technical Project Coordinators

The different tasks within the collaboration are supervised by technical project coordinators (TPC). TPCs are nominated for the work related to detectors, computing, and infrastructure. The TPCs carry responsibility for all technical decisions concerning their project. Each TPC has sole responsibility for the assignment of task to manpower within the project. Design considerations, which have (or potentially might have) impact to other parts of HADES, have to be discussed with the corresponding TPC and with the TC. No such decision may be taken against the veto of the TC. In case of a "decision making deadlock", the spokesperson should be informed. The TPC is obliged to deliver a freeze-out of the project design upon request by the TC.

1.5.6. Operations Coordinator

The Operations Coordinator acts as an intermediary between the Acceleration Operation of GSI FAIR (ACC) and ensures the optimal execution of scheduled experiments. He/she acts as Link Scientist at GSI/FAIR fulfilling the duties outlined in the Rules and Procedures of GSI/FAIR proposal submission platform, GATE. The Operations Coordinator, together with the Technical Coordinator, organizes the regular Technical Coordination Meetings and the Technical Board Meetings.

1.5.7. Technical Board (TB)

The Technical Board is chaired by the Technical Coordinator. It consists of the Technical Project Coordinators and the Operations Coordinator. Its aim is to coordinate the different projects and to assist the Technical Coordinator in the decision-making procedure. The Technical Board meets at least at each Collaboration Meeting and on a shorter notice when necessary.

1.5. 8. Software and Computing Coordinator (SCC)

The Software and Computing Coordinator (SCC) is elected by the CB through a simple majority of votes and presides over the activities of the Software and Computing board. He/she shall report regularly to the CB and to the entire collaboration.

1. 5. 9 Software and Computing Board .

The responsibilities of the Software and Computing Board encompass all activities involved in the workflow of data processing, ranging from the collection of events during experiments to the generation of pre-processed data (DST). The board is chaired by the Software and Computing Coordinator.

The board oversees the allocation and availability of computing resources within the collaboration.It ensures the readiness of analysis software, databases, and data storage for both online and offline data processing, and maintains the necessary simulation packages for all experiments. Furthermore, it upholds the quality of software, calibration, and alignment parameters, while ensuring the accessibility of pre-processed data (DST) to the entire collaboration.
The board is also responsible for prioritizing software and computing activities in close cooperation with the PB/TB and for submitting regular reports to the collaboration.

1.5.10 Physics Coordinator

The Physics Coordinator (PC) is elected by the CB through a simple majority of vote. The PC is responsible for coordinating the entire workflow of data analysis, based on pre-processed data (DSTs) towards the final datasets presented in publications. To achieve this, he/she coordinates the analysis conducted by the PWGs and ensures high data quality in close collaboration with the Computing Board. The Physics Coordinator convenes the Physics Board on a regular basis. The

Physics Coordinator is an ex-officio member of the Executive Board.

1.5.11 Physics Board

The Physics Board (PB) is chaired by the Physics Coordinator (PC). The PC invites for board meetings on a regular basis. The PB coordinates and assesses activities concerning physics topics of interest, including simulations and optimization of the physics performance of HADES.
It coordinates all physics analysis and simulation-related issues and communicates problems identified in the analysis and simulation framework to the SCB. It coordinates, in close collaboration with the Technical Board and the Publication and Documentation Committee, the HADES publications and internal notes. Conveners of PWGs are appointed in consultation with the Spokespersons and endorsed by the Executive Board (XB), as is the establishment of new PWGs.
The Physics Board (PB) comprises the Physics Coordinator and the conveners of the PWGs. Ex-officio members include the Spokesperson, the Deputy Spokespersons, and other Coordinators. The PC may extend the composition of the PB to include other members of HADES with significant responsibilities related to physics or simulation matters.

1.5.12 Tasks Forces

SP and the CB can install task forces for addressing and solving special issues, as e.g. future extensions of the present setup. Technical solutions are prepared in consultation with the TC and with corresponding project coordinators.

1.5.13 Publication and Documentation Committee (PDC)

The board is composed of five ex officio members, i.e. the members of the XB. At least six additional members are elected by the CB for a 3-year mandate by simple majority of the votes cast. The PDC committee prepares collaboration documents (design report, status reports) and is responsible for the HADES WWW pages. PDC members are invited to the PB meetings. The committee organizes the internal review of all contributions to conferences and journals prior to submission. Details are laid out in section 2 (Hades Analysis and Publication Policies).

1.5.14. Resource coordinator:

The Resource Coordinator is appointed by the GSI/FAIR management. He/she represents the HADES collaboration at the Resource Review Board where financial issues concerning future experiments at FAIR are discussed.

1.6. General conditions

The general terms of this agreement between GSI and the Parties are described in the document "General Conditions for Experiments at GSI". By signing the agreement, the Parties agree with the conditions defined in this document.

1.7. Data and intellectual properties

The rules laid down in the original MoU shall apply accordingly. New and associated members which did not sign the original agreement confirm by signing the present agreement that they consent and conform to these rules.

1.8. GSI and collaborating institutions obligations

The details of responsibilities and obligations of each Party are defined in sections 6 to 8.

1.9. Effective date

The addendum shall become effective for each party according to chapter 7.1. It shall remain in effect until the Maintenance & Operation MoU for HADES at FAIR will be signed and become effective.

The deadline of involvement of each party is until the Maintenance & Operation MoU for HADES at FAIR will be signed and become effective, unless differently stated and expressed in chapter 6 which defines the commitment of each institution. A further extension of the agreement is, however, possible.

1.10.Common funds

The participation to the common funds is mandatory. Every Party, except for the Host, contributes at least a sum of 1000€ per annum, which shall be used to cover the running costs of the experiment (consumables, small repairs or maintenance). As an exception lower contributions can be discussed and unanimously agreed upon, after a formal request by the Party to the CB and an agreement by the CB majority, but shall never be lower than 500 € per Party. Other ways to contribute to the HADES running costs may also be envisaged. The decision to use common funds for any expense shall be taken by the Executive Board. The contributions of the Party are transferred to GSI and booked to the HADES Common Fund Account. The authorized signatory of this account is the HADES department leader at GSI who will spend the money in accordance with decisions of the Executive Board.

1.11.Confidentiality

(1) Confidential Information within the meaning of this agreement shall be all information either arising from documents (including in electronic form) provided by the Disclosing Party to the Recipient in connection with this agreement and which has been explicitly marked as "confidential", or when disclosed orally, has been identified as confidential at the time of disclosure and has been confirmed and designated in writing within 15 days from oral disclosure at the latest as confidential information by the Disclosing Party.

(2) The Recipient undertakes to maintain strict confidentiality and to treat with the same degree of protection with which they treat their own Confidential Information and not to disclose such information to third parties. Moreover, the Recipient undertakes to use Confidential Information exclusively for the purpose of fulfillment of the agreement.

(3) The Recipient shall be entitled to disclose Confidential Information to its employees, however, only to the extent necessary to fulfill the agreement. The Recipients shall be responsible for the fulfillment of the above obligations on the part of their employees and shall ensure that their employees remain so obliged, as far as legally possible, during and two years after the end of the agreement and/or after the termination of employment.

(4) In order to achieve the object of this agreement, Confidential Information may also be disclosed to third parties provided that the Disclosing Party has given its prior written consent. In the event of disclosure of Confidential Information, the Recipient shall impose, in written form, the confidentiality obligation undertaken by it upon such individuals or companies whom the Parties entrust with Confidential Information or work under this Contract. The imposition of the confidentiality obligation upon such third party by the Recipient shall constitute an agreement for the benefit of the Disclosing Party with recourse. In addition, the Recipient shall be jointly and severally liable for compliance by the third party with this Confidentiality Agreement.

1.12.Exemptions from the undertaking of confidentiality

(1) The obligations specified above shall not apply to the results of data analysis as well as of simulations even if they are marked as confidential. They are treated in accordance with rules given in chapter 2. "HADES Publication Policies".

(2) The obligations specified above shall not also apply to the extent to which the Recipient can prove that such Confidential Information was lawfully:

- available to the general public at the time of disclosure or became available to the general public thereafter,
- disclosed to the Recipient without any obligation of confidence by a third party who is in lawful possession thereof and under no obligation of confidence to the Disclosing Party,
- already in the possession of or known to the Receiving Party at the time of disclosure,
- developed independently by the Receiving Party, and in good faith, by its employees who did not have access to the Confidential Information, or
- required to be disclosed by the Receiving Party in a judicial or administrative proceeding

1.13.Return/destruction of documents

The Recipient shall return all documents and records containing Confidential Information within the meaning as defined above and all copies thereof to the Disclosing Party at the latter's request within one year after this agreement has been executed. For this purpose, the term documents shall also include floppy disks and any other kind of data carriers. In the event of data stores incapable of being surrendered, such as hard disks etc., the Recipient shall delete or otherwise destroy the relevant data relating to Confidential Information at the request of the Disclosing Party. At the request of the Disclosing Party, the Recipient shall confirm in writing without undue delay that all documents and records have been returned or, as the case may be, deleted or destroyed in accordance with the obligation stipulated above. To prohibit the roaming of premature analysis results which have not been approved by the HADES Collaboration

2. HADES Analysis and Publication Polices

2.1. Data Analysis

(1) Data from all HADES beam times is available for analysis to all members of the HADES Collaboration. The analysis has to be based on data summary tapes (DST) obtained with the official HYDRA analysis package.

(2) All analysis projects carried out have to be announced to the Physics Coordinator and/or Executive Board who will, in consultation with the group announcing the analysis, assign the proper PWG.

(3) The progress of the analysis has to be regularly presented in open (to the collaboration) analysis meeting (see section PWG).

(4) All analysis activities leading to HADES publications are carried out in one of the PWGs. The number of active PWG's can change depending on the evolution of the experimental programme.

(5) The PWG leaders in consultation with the XB define the computer infrastructure used for documentation and communication (tools). All PWG use the same tools.

(6) Each PWG schedules regular meetings during fixed weekly time slots which are defined by the PWG leaders and validated by the PC and/or XB. The meetings are open to the collaboration and organized as video conferences. The date of a given PWG meeting is chosen after consulting the other PWG leaders and PC is announced at least one week in advance. The PWG leaders are responsible for the organization of respective analysis sessions during regular collaboration meetings.

(7) Data being ready for a public presentation or a publication are presented in a PWG meeting and validated by the PWG leader(s) and PC (or the spokesperson). The corresponding pictures are stored in a password-protected location.

2.2. Presentation of Analysis Results

(1) The Spokesperson will distribute speaking invitations received by the Collaboration on the basis of suitability of the speaker to the topic, and an equitable distribution of talks to individuals and institutions. Members of the Collaboration who receive personal invitations to give talks must inform the Spokesperson and Physics Coordinator. Submission of an abstract to a conference should be approved by the corresponding PWG leader and the PC or XB members. The abstracts are posted to the forum for the collaboration information. When a talk with proceedings is scheduled, the PDC should be informed and a member will be mandated to supervise the talk and proceedings preparation.

(2) All members of the Collaboration should exercise caution and good judgment when discussing experimental results with individuals outside the Collaboration before the results have been published (i.e., presented publicly in a seminar or conference or submitted for publication in a scientific journal). These results should clearly be labeled "Preliminary".

(3) When individuals outside the Collaboration are consulted for advice on the analysis or interpretation of the data, those individuals should be asked to respect the confidentiality of the data.

(4) Members of the Collaboration should not present unpublished analysis results outside the collaboration in seminars, conferences, or other public forum unless:

- The plots to be publicly shown have been validated, as described above.
- The presentation has been posted in the HADES forum and the collaboration notified with a response period of at least one week for comments.
- In some specific cases (first presentation of new results, important conference, etc.) a rehearsal is made, after request of the Spokesperson, in front of at least two members of the collaboration, PC and a PWG leader.
- Final approval on the presentation content is obtained from the Spokesperson following the response period

2.3. Publication of Papers

Papers of categories I

They present physics results which require extensive review and consultation of several collaboration members. The Publication and documentation Committee (PDC) will steer the publication process.

The submission of a category I paper proceeds along the following steps:

(1) The leader of the PWG which guides the analysis process after consultation with PC announces to the PDC the preparation of a paper and proposes the name of the chair of the writing committee and eventually other colleagues who will participate in preparing the draft.

(2) The PDC approves the Paper Writing Committee (PWC) and adds a minimum of one colleague who did not take part in the respective analysis procedure as member of the writing committee. This person will take care that the general readability for non-experts is realized and acts as an unbiased writer.

(3) Upon finalization of the draft, the PDC forms an internal Paper Review Committee (PRC), comprising a minimum of two colleagues, who will read and comment on the paper. The process of internal review is finished, when both the PRC and PWC agree on the quality of the paper draft.

(4) The draft is placed on the Forum and the Collaboration is informed by email about the new paper draft. The discussion about the paper draft proceeds openly using the HADES Forum. The remarks are considered by the PWC. This review process lasts for a period of two weeks.

(5) After this process, the PDC validates and submits the draft to a journal agreed about in consultation with the PWC. As corresponding email, the address hades-info@gsi.de is used. Read access to hades-info@gsi.de is granted to the whole Collaboration.

(6) The iteration with the journal review team is steered by the PDC.

2.3.1. Category II papers

A conference contribution requiring a proceeding is announced in time to the PDC. It is prepared by the attendee under the supervision of the supervisor or group leader of the attendee and of the respective PWG leader after consultation with PC. The PDC assigns a member who will iterate the paper with the conference attendee. This member will also take care that. the talk and the paper draft are posted to the FORUM in due time before the conference/workshop and the proceedings submission deadline, respectively. The time period for discussion on the HADES Forum is one week and the paper is submitted by the conference attendee.

2.3.2. Category III papers

This are publications concerned with instrumentation and simulations and reflect development work done mainly by a single local group and not using data obtained with the complete set-up. Such publications will be signed by members of this group and should be prepared in coordination with the respective PWG leader, PC or member of the technical board. In addition, the PDC asks a qualified collaboration member (external to the submitting group) to review the manuscript and to communicate any objections both to the author(s) and to the PDC. Papers reflecting the work done by several subgroups might require the full approval procedure applicable to physics papers. Such a case is identified by the PDC.

2.4. Authors' lists

The Spokesperson and the CB Chairperson, based on the collaboration member database and following consultation of each Party's representative, shall set up the authors' lists for the publications of the collaboration with the following conditions:

- physicists, who participated during experiment, i.e. making shifts, contributing into preparation of the experiment etc. are included;
- physicists involved in the analysis of data related to the experiment are included;
- exception from above has to be approved by CB.

In particular the following lists should be maintained:

- active HADES members, that also show up on the HADES web site;
- authors for publications on physics journals;
- authors for conference proceedings, which only includes physicists;
- authors for other kinds of publications (like technical papers, annual reports, national meetings, etc.).

These lists shall be released by the CB chairperson, who shall update and make them available on a suitable location of the collaboration on-line document repository (http://webdb.gsi.de/pls/hades_webdb/hades_webdb.home) at least once per annum.

Any publication resulting partly or totally from the work carried out in the framework of the HADES project shall mention "HADES collaboration".

Particularly, the authors of conference proceedings should always make an effort to use the full actual author list by asking the editor of conference proceedings for an extra page. Only in case that it is refused, single author name and "for the HADES collaboration" could be used instead. Also in case of

several HADES contributions to the same conference proceedings it is recommended to make only one contribution with the full author list and the other with single author and "for the HADES collaboration".

3. General conditions for experiments with HADES at GSI

GSI is the Host for the collaboration. GSI shall provide full support to conduct experiments at the HADES experimental site, according to the rules for approved experiments. Beam time shall be provided by GSI according to the standard application scheme. It shall be free of charge.

GSI provides and maintains the following infrastructure required for operating HADES for the time the HADES collaborations formally exists and at minimum for the period this agreement is signed. This includes:

- Basic cave infrastructure like cranes, counting houses, detector preparation container, gas inventory and security installations.
- Supply lines for electricity, cooling water, liquid nitrogen, high bandwidth computer network.
- Beam line installation including beam diagnostic elements, vacuum pumps and gauges, magnets and power supplies.
- Basic database infrastructure in the ORACLE framework.
- Permanent storage place for experimental data and analysis results on the GSI archive.

Typical consumables required to operate the spectrometer (detector gas, liquid Helium/Nitrogen, archiving media etc.) are subject to the common fund. GSI shall provide full access to the central computing farm and provides upgrades matching the computing needs of 50.000 cores·days and 200TByte distributed disc space per experimental run in accordance to the annual IT budget of GSI. GSI shall provide also access to the available lodging facilities and office space for the members of the HADES collaboration during the time needed to prepare and perform the experiments.

4. Resources and responsibilities

The following table summarizes the current situation with respect to resources and responsibilities among the different institutions, along with some extrapolation concerning the expected funding and manpower profiles.

Group	Manpower (physicists)	Common funds (k€/ year)	funds and total effective manpower	Physics Analysis	New hardware construction (+tests)	Hardware maintenance	Software development and maintenance
AGH Cracow	5 perm.	2			readout electronics for STS		
JU Cracow	4 perm. 1 postdocs 3 students	1.5 (till 2027) - 3 (beam-time)	440k€ 4 FTE	elementary + medium (hadrons and dielectrons)	ECAL (main frame) + FD (2nd tracking station)	FD+FW	FD (tracking)
IFJ PAN Cracow	2 perm.	1	1 FTE	elementary + medium (hadrons and dielectrons)			
UW Warsaw	2 perm. 3 students	0.5	1.1 FTE	medium (hadrons, strangeness)			

WUT Warsaw	2 perm. 1 postdocs 6 students	2	3.5 FTE	medium: two-particle correlations, strangeness, femyoscopy			
GSI Darmstadt	8 (HADES) 3 (EE)	-	500 k€ 10 FTE	Low-level, di-electrons, e.b.e. fluctuations, incl. hadrons	Cryogenics, in-beam detectors	Magnet, in-beam detectors, cave infrastructure, MDC	EDC, event building, online QA, event reconstruction, database, MDC
TU Darmstadt	1 perm. 1 postdoc 5 students	2	150 k€ 3 FTE	elementary + medium (dielectrons, hadrons and light nuclei)	ECAL (read-out electronics), START, BMON		T0 reconstruction, START calibration
IKF Frankfurt	3 perm.	8		medium (dielectrons strangeness, flow)		MDC (analogue electronics)	Tracking, alignment
JLU Giessen	1 perm. 2 Phds 2 students	8	3 FTE	elementary, medium (hadrons, dielectrons)	RICH upgrade (slow control)	RICH (slow control)	RICH reconstruction, slow control
Ruhr U. Bochum	2 perm 3-4 postdocs 3 Phds	5 T	6 FTE	elementary (hadrons)	PSP 1.1.2.7.4	STS1, iTOF	Elastics for normalization
FredU Nicosia	3 perm. 1 postdoc	1	26 k€ 2 FTE	hadrons (strangeness, flow)			HPC cluster
IPN Orsay	2 perm. 2 students	3	40 k€ 3 FTE	elementary (dielectrons, hadrons)	FD (2nd station +support)	MDC	Pion beam optics
NPI Rez	3 perm.	1	293 + 390 k€	medium (dielectrons+ strangeness)	ECAL (PMTs, HV system, LED calibr.,construction of modules)	TOF, FW, ECAL	TOF, ECAL, FW
BUW Wuppertal	3 perm. 3 students	4	460 k€ 3 FTE	medium+ elementary (dielectrons)	RICH (electr. for photodetector)	RICH	

5. List of tasks versus Parties

The situation of the collaborating Parties with respect to their tasks within the collaboration is updated on a regular basis in an on-line table accessible at http://jspc29.x-matter.uni-frankfurt.de/ethercalc/hades_mou_tasks.

6. Final Provisions

This Memorandum of Understanding shall become effective for each Party when all the signed agreements are lodged at the Host. This agreement shall remain in force until the Maintenance & Operation MoU for HADES at FAIR will be signed and become effective. It may be terminated by extraordinary dismissal with not less than 6 month prior written notice. A further extension of the agreement is however possible.

The MoU for the execution of the experiment HADES dating 29.9.1999, the General conditions for experiments at GSI and Annex A are an integral part of this agreement. This agreement shall be governed by the law of the country where the Host is based. Each Party shall ensure that the students and scientists taking part in the Project are fully informed of the terms of this agreement and personally undertake to comply with such terms.

Annulment or invalidity of one or more articles in this agreement shall not affect the legal validity of the remaining articles

7. Disputes

The parties shall endeavour to resolve their differences amicably. Should they fail to do so, any disputes shall be settled in accordance with the rules of conciliation and arbitration of the international Chamber of Commerce under the aegis of one or more arbitrators appointed pursuant to these rules

8. Commitments and signatures of each party

IN WITNESS hereof, the undersigned Parties describe their contribution, both in terms of manpower and funds and execute this Agreement