

Purchase Contract

(hereafter the "Contract")

1. CONTRACTUAL PARTIES

1.1 Fyzikální ústav AV ČR, v. v. i.,

with seat: Na Slovance 1999/2, 182 21 Praha 8,
represented by: RNDr. Michael Prouza, Ph.D. – Director,
Registered in the register of public research institutions of the Ministry of Education, Youth and Sports
of the Czech Republic.

Bank: [REDACTED]
Account No.: [REDACTED]
ID No.: 68378271
Tax ID No.: CZ68378271

(hereinafter the "Buyer")

and

1.2 Měřicí technika Morava s.r.o.,

with seat: Babická, 619, 664 84 Zastávka, Czech Republic,
represented by: Dr. Dušan Novotný, CEO
registered in Obchodní rejstřík u Krajského soudu v Brně, oddíl C, vložka 77278.

Bank: [REDACTED]
Account No.: [REDACTED]
ID No.: 29316715
Tax ID No.: CZ29316715

(hereinafter the "Seller"),

(the Buyer and the Seller are hereinafter jointly referred to as the "Parties" and each of them
individually as a "Party").



2. FUNDAMENTAL PROVISIONS

- 2.1 The Buyer is a public research institution whose primary activity is scientific research in the area of physics, especially elementary particles physics, condensed systems, plasma and optics.
- 2.2 The Buyer is in the process of implementing a project Reg. No. CZ.02.1.01/0.0/0.0/16_013/0001406 with the title "SAFMAT Infrastructure" within the framework of the Operational Programme Research, Development and Education (OP RDE) (hereafter the "**Project**").
- 2.3 The subject matter of this Contract is funded using grant provided to the Project, for which it is destined.
- 2.4 The Seller was selected as the winner of a public procurement procedure announced by the Buyer in accordance with Act No. 134/2016 Coll., on Public Procurement, as amended (hereinafter the "**Act**"), for the public contract called "**X-band Electron Spin Resonance Spectrometer System**" (hereinafter the "**Procurement Procedure**").
- 2.5 The documentation necessary for the execution of the subject of performance hereof consist of
- 2.5.1 Technical specifications of the subject of performance hereof attached as **Annex No. 1** hereto.
- 2.5.2 The Seller's bid submitted within the Procurement Procedure in its parts which describe the subject of performance in technical detail (hereinafter the "**Sellers's Bid**"); the Sellers's Bid forms form **Annex No. 2** to this Contract and an integral part hereof.
- In the event of a conflict between the Contract's Annexes the technical specification / requirement of the higher level / quality shall prevail.
- 2.6 The Seller declares that it has all the professional prerequisites required for the supply of the subject of performance under this Contract, is authorised to supply the subject of performance and there exist no obstacles on the part of the Seller that would prevent the Seller from supplying the subject of this Contract to the Buyer.
- 2.7 The Seller acknowledges that the Buyer considers the Seller's participation in the Procedure, provided that the Seller complies with all qualification requirements, as the confirmation of the fact that the Seller is capable, within the meaning of Section 5(1) of the Act No. 89/2012 Coll., the Civil Code, as amended (hereinafter the "**Civil Code**") of providing performance under the Contract with such knowledge, diligence and care that is associated and expected of the Seller's profession, and that the Seller's potential performance lacking such professional care would give rise to corresponding liability on the Seller's part. The Seller is prohibited from misusing its qualities as the expert or its economic position in order to create or exploit dependency of the weaker Party or to establish an unjustified imbalance in the mutual rights and obligation of the Parties.
- 2.8 The Seller acknowledges that the Buyer is not in connection to the subject of this Contract an entrepreneur and also that the subject of this Contract is not related to any business activities of the Buyer.



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- 2.9 The Seller acknowledges that the production and delivery of the subject of performance within the specified time and of the specified quality, as shown in Annexes No. 1 and 2 of this Contract (including the delivery and invoicing), is essential for the Buyer. If the Seller fails to meet contractual requirements, it may incur damage of the Buyer.
- 2.10 The Seller declares that he accepts the “risk of changed circumstances” within the meaning of Section 1765(2) of the Civil Code.
- 2.11 The Contractual Parties declare that they shall maintain confidentiality with respect to all facts and information, which they learn in connection herewith and / or during performance hereunder, and whose disclosure could cause damage to either Party. Confidentiality provisions do not prejudice obligations on the part of the Buyer arising from valid legislation.

3. SUBJECT-MATTER OF THE CONTRACT

- 3.1 The subject of this Contract is the obligation on the part of the Seller to deliver and transfer into the Buyer’s ownership:

X-band Electron Spin Resonance Spectrometer System (hereafter the “Equipment”)

and the Buyer undertakes to take delivery of the Equipment and to pay to the Seller the agreed upon price.

- 3.2 The following activities form an integral part of the performance to be provided by the Seller:
- 3.2.1 Transport of the Equipment incl. all accessories specified in Annexes 1 and 2 of the Contract to the site, un-packaging and control thereof,
 - 3.2.2 Installation of the Equipment at the site,
 - 3.2.3 Demonstration of Accuracy of the Equipment prior to the takeover,
 - 3.2.4 Delivery of instructions and operating and repair manuals Equipment in Czech or English language to the Buyer, in electronic and hardcopy (printed) versions,
 - 3.2.5 Training of operators at the site within 4 hours,
 - 3.2.6 Free-of-charge warranty service including service inspections,
 - 3.2.7 Provision of technical support in the form of consultations.
- 3.3 The subject of performance (Equipment) is specified in detail in Annexes No. 1 and No. 2 hereto.
- 3.4 The Seller shall be liable for the Equipment and related services to be in full compliance with this Contract, its Annexes, the submitted bid and all valid legal regulation, technical and quality standards and that the Buyer will be able to use the Equipment for the defined purpose. In case of any conflict between applicable standards it is understood that the more strict standard or its part shall always



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apply.

- 3.5 The delivered Equipment and all its parts and accessories must be brand new and unused.

4. PERFORMANCE PERIOD

- 4.1 The Seller undertakes to handover the Equipment properly after its previous installation, demonstration of its functionality and training of its personnel within 12 weeks of the conclusion hereof.
- 4.2 The performance period shall be extended for a period during which the Seller could not perform due to obstacles on the part of the Buyer.

5. PURCHASE PRICE, INVOICING, PAYMENTS

- 5.1 The purchase price is based on the Seller's submitted bid and amount to 7 850 000,00 CZK (in words: seven million eight hundred fifty thousand Czech crowns) excluding VAT (hereinafter the "Price"). VAT shall be paid by the Buyer and settled in accordance with the valid Czech regulation.
- 5.2 The Price represents the maximum binding offer by the Seller and includes any and all performance provided by the Seller in connection with meeting the Buyer's requirements for the proper and complete delivery of the Equipment hereunder, as well as all costs that the Seller may incur in connection with the delivery, installation and handover, and including all other costs of expenses that may arise in connection with creation of an intellectual property creation and its protection.
- 5.3 The Parties agreed that the Price shall be invoiced after the handover protocol (hereinafter the "Handover Protocol") in accordance with Section 10.4 will have been signed between the Parties.
- 5.4 Invoices issued by the Seller hereunder shall contain all the requirements stipulated by Act No. 235/2004 Coll., on Value Added Tax, as amended, and the Contract number.
- 5.5 The Buyer prefers electronic invoicing, with the invoices being delivered to efaktury@fzu.cz. All issued invoices shall comply with any international treaties prohibiting double taxation, if applicable.
- 5.6 Invoices shall be payable within thirty (30) days of the date of their delivery to the Buyer. Payment of the invoiced amount means the date of its remittance to the Seller's account.
- 5.7 If an invoice is not issued in conformity with the payment terms stipulated by the Contract or if it does not comply with the requirements stipulated by law, the Buyer shall be entitled to return the invoice to the Seller as incomplete, or incorrectly issued, for correction or issue of a new invoice, as appropriate, within five (5) business days of the date of its delivery to the Buyer. In such a case, the Buyer shall not be in delay with the payment of the Price or part thereof and the Seller shall issue a corrected invoice with a new and identical maturity period commencing on the date of delivery of the corrected or newly issued invoice to the Buyer.
- 5.8 The Buyer shall be entitled to unilaterally set off against any receivables claimed by the Seller any of its payment due to:



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5.8.1 damages caused by the Seller,

5.8.2 sanctions.

5.9 The Seller shall not be entitled to set off any of its receivables against any part of the Buyer's receivable hereunder.

6. OWNERSHIP TITLE

6.1 The ownership right to the Equipment shall pass to the Buyer by handover. Handover shall be understood as delivery and acceptance of the Equipment duly confirmed by Parties on the Handover Protocol.

7. PLACE OF DELIVERY OF THE EQUIPMENT

7.1 The place of delivery of the Equipment shall be the Room No. 23, Building D at the Institute of Physics of the Academy of Sciences of the Czech Republic, v.v.i., Cukrovarnická 10/112, 162 00 Praha 6, Czech Republic.

8. PREPAREDNESS OF THE PLACE OF DELIVERY

8.1 The Buyer is obliged to allow the Seller to install the Equipment at the place of performance. In the case of organizational reasons on its side the Buyer reserves the right to extend the date of commencement of the installation by means of written notification addressed to the Seller at the address specified in paragraph 11.1 of this Contract.

9. COOPERATION OF THE PARTIES

9.1 The Seller undertakes to notify the Buyer of any obstacles on its part, which may negatively influence proper and timely delivery of the Equipment.

9.2 The Parties wish to deviate from provisions of Section 2126 of the Civil Code and agree that the Seller shall not be authorized to use institutes established therein.

10. DELIVERY, INSTALLATION, HANDOVER AND ACCEPTANCE

10.1 The Seller shall transport the Equipment at its own cost to the place of handover. If the shipment is intact, the Buyer shall issue delivery note for the Seller.

10.2 The Seller shall perform and document the installation of the Equipment and launch experimental test in order to verify whether the Equipment is functional and meets the technical requirements of Annexes No. 1 and 2 hereof.

10.3 Handover procedure includes handover of any and all technical documentation pertaining to the Equipment, user manuals and certificate of compliance of the Equipment and all its parts and accessories with approved standards.



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- 10.4 The handover procedure shall be completed by handover of the Equipment confirmed by the Handover Protocol containing specifications of all performed tests. The Handover Protocol shall contain the following mandatory information:
- 10.4.1 Information about the Seller, the Buyer and any subcontractors,
 - 10.4.2 Description of the Equipment including description of all components and serial numbers,
 - 10.4.3 Description of executed acceptance tests: type of test, duration, achieved parameters,
 - 10.4.4 confirmation of training of the operator within 4 hours,
 - 10.4.5 List of technical documentation including the manuals,
 - 10.4.6 Eventually reservation of the Buyer regarding minor defects and unfinished work including the manner and deadline for their removal,
 - 10.4.7 Date of signature of the Equipment Handover Protocol.
- 10.5 Handover of the Equipment does not release the Seller from liability for damage caused by product defects.
- 10.6 The Buyer shall not be obliged to accept the Equipment, which would show defects or unfinished work and which would otherwise not form a barrier, on their own or in connection with other defects, to using the Equipment. In this case, the Buyer shall issue a record containing the reason for its refusal to accept the Equipment.
- 10.7 Should the Buyer not exercise its right not to accept the Equipment with defects or unfinished work, the Seller and the Buyer shall list these defects or unfinished work in the Handover Protocol, including the manner and deadline for their removal. Should the Parties not be able to agree in the Handover Protocol on the deadline for removal of the defects, it shall be understood that any defects shall be removed / rectified within 48 hours from the handover and acceptance of the Equipment.

11. REPRESENTATIVES, NOTICES:

- 11.1 The Seller authorized the following representatives to communicate with the Buyer in all matters relating to the Equipment delivery:

[REDACTED]
[REDACTED]
[REDACTED]

- 11.2 The Buyer authorized the following representatives to communicate with the Seller:

[REDACTED]
[REDACTED]
[REDACTED]



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- 11.3 All notifications to be made between the Parties hereunder must be made out in writing and delivered to the other Party by hand (with confirmed receipt) or by registered post (to the Buyer's or Seller's address), or in some other form of registered post or electronic delivery incorporating electronic signature (qualified certificate) to epodatelna@fzu.cz in case of the Buyer and to info@mt-m.eu in case of the Seller.
- 11.4 In all technical and expert matters (discussions on the Equipment testing and demonstration, notification of the need to provide warranty or post-warranty service etc.) electronic communication between technical representatives of the Parties will be acceptable using e-mail addresses defined in Sections 11.1 and 11.2.

12. TERMINATION

- 12.1 This Contract may be terminated early by agreement of the Parties or withdrawal from the Contract on the grounds stipulated by law or in the Contract.
- 12.2 The Buyer is entitled to withdraw from the Contract without any penalty from Seller in any of the following events:
- 12.2.1 The Seller fails to meet the deadline pursuant to Section 4.1 hereof.
 - 12.2.2 Technical parameters or other conditions required in the technical specification defined in Annex No. 1 and 2 hereto and in the relevant valid technical standards will not be achieved by the Equipment at handover,
 - 12.2.3 Facts emerge bearing evidence that the Seller will not be able to deliver and handover the Equipment.
 - 12.2.4 The Seller will not meet the qualification criteria within the Procurement Procedure.
- 12.3 The Seller is entitled to withdraw from the Contract in the event of the Buyer being in default with the payment for more than 2 months with the exception of the cases when the Buyer refused invoice due to defect on the delivered Equipment or due to breach of the Contract by the Seller.
- 12.4 Withdrawal from the Contract becomes effective on the day the written notification to that effect is delivered to the other Party. The Party which had received performance from the other Party prior to such withdrawal shall duly return such performance.

13. INSURANCE

- 13.1 The Seller undertakes to insure the Equipment against all risks, in the amount of the Price of the Equipment for the entire period commencing when transport of the Equipment starts until duly handed over to the Buyer. In case of breach of this obligation, the Seller shall be liable to the Buyer for any damage that may arise.
- 13.2 The Seller is liable for the damage that he has caused. The Seller is also liable for damage caused by third parties undertaken to carry out performance or its part under this Contract.



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14. WARRANTY TERMS

- 14.1 The Seller shall provide warranty for the quality of the Equipment for a period of 24 months. The warranty term shall commence on the day following the date of signing of the Handover Protocol pursuant to Section 10.4 hereof.
- 14.2 Should the Buyer discover a defect, he shall notify the Seller to rectify such defect using the email address info@mt-m.eu.
- 14.3 The Seller shall be obliged to rectify any claimed defects on-site within 10 working days from receipt of the Buyer's notification. In cases of unusual defects, the Seller shall be obliged to rectify the defect in the period corresponding to the nature of the defect and to define the deadline for the handover of the rectified Equipment.
- 14.4 Any and all costs associated with defect rectification / repair including transport and travel expenses shall be always borne by the Seller.
- 14.5 The repaired Equipment shall be handed over by the Seller to the Buyer on the basis of a protocol confirming removal of the defect (hereinafter the "**Repair Protocol**") containing confirmations of both Parties that the Equipment was duly repaired and is defect-free.
- 14.6 The repaired portion of the Equipment shall be subject to a new warranty term in accordance with Section 14.1, which commences to run on the day following the date when the Repair Protocol was executed.
- 14.7 Should the Equipment suffer from defects which make it demonstrably unusable for a period exceeding 60 days (defect period) during any six (or less) consecutive months during the warranty term, the Seller shall be obliged to rectify such defect by delivering new defect-free Equipment in accordance with Section 2106(1)(a) of the Civil Code within 60 days from the date the Seller was called upon to deliver the new Equipment. The Equipment is demonstrably unusable, when the technical parameters or other conditions required in the technical specification defined in Annex No. 1 and 2 hereto and in the relevant valid technical standards are not met.

15. CONTRACTUAL PENALTIES

- 15.1 The Buyer shall have the right to a penalty in the amount of 0.2 % of the Price for each commenced day of delay with the performance pursuant to Section 4.1 hereof.
- 15.2 The Buyer is entitled to claim against the Seller a contractual fine of CZK 300 for each commenced day of delay in the event of the Seller's delay in performing the warranty repair.
- 15.3 The Buyer shall be entitled to claim a contractual penalty against the Seller in the amount of 30 % of the Price, in case he will subsequently take advantage of the opportunity to withdraw from the Contract pursuant to Section 12.2.1 and 12.2.2.
- 15.4 In case of default in payment of any due receivables (monetary debt) under the Contract, the defaulting Buyer or Seller (the debtor) shall be obliged to pay a contractual penalty at the statutory rate for each



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commenced day of delay with the payment.

15.5 Contractual penalties are payable within 30 days of notification demanding payment thereof.

15.6 Payment of the contractual penalty does not prejudice the rights of the Parties to claim damages; the Parties exclude use of Section 2050 of the Civil Code.

16. DISPUTES

16.1 Any and all disputes arising out of this Contract or the legal relationships connected with the Contract shall be resolved by the Parties by mutual negotiations. In the event that any dispute cannot be resolved by negotiations within sixty (60) days, the dispute shall be resolved by the competent court in the Czech Republic based on application of any of the Parties; the court having jurisdiction will be the court where the seat of the Buyer is located. Disputes shall be resolved exclusively by the law of the Czech Republic.

17. ACCEPTANCE OF THE PROJECT RULES

17.1 The Seller shall be obliged to cooperate during financial inspections carried out in accordance with Act 320/2001 Coll., on Financial Inspections, as amended.

17.2 The Seller shall be obliged to provide to the Buyer any and all documents relating to the subject matter hereof, as may be requested by the audit body.

17.3 The Seller shall be entitled to fulfil / perform any part hereof using subcontractors. In such cases the Seller shall be obliged to ensure that each of his subcontractors complies with provisions of paragraphs 17.1 and 17.2.

18. FINAL PROVISIONS

18.1 This Contract represents the entire agreement between the Buyer and the Seller. The relationships between the Parties not regulated in this Contract shall be governed by the Civil Code.

18.2 In the event that any of the provisions of this Contract shall later be shown or determined to be invalid, ineffective or unenforceable, then such invalidity, ineffectiveness or unenforceability shall not cause invalidity, ineffectiveness or unenforceability of the Contract as a whole. In such event the Parties undertake without undue delay to subsequently clarify any such provision or replace after mutual agreement such invalid, ineffective or unenforceable provision of the Contract by a new provision, that in the extent permitted by the laws and regulations of the Czech Republic, relates as closely as possible to the intentions of the Parties to the Contract at the time of creation hereof.

18.3 This Contract may be changed or supplemented solely by means of numbered amendments in writing, furnished with the details of time and place and signed by duly authorised representatives of the Parties. The Parties expressly reject, within the bounds of Section 564 of the Civil Code, modifications to the Contract in any other manner.

18.4 This Contract is drawn up in three (3) counterparts, each of which is deemed to be the original. The



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Seller shall receive two (2) counterparts, the Buyer shall receive one (1) counterpart.

- 18.5 The Parties expressly agree that the Contract as a whole, including all attachments and data on the Parties, subject of the Contract, numerical designation of this Contract, the Price and the date of the Contract conclusion, will be published in accordance with Act No. 340/2015 Coll. on special conditions for the effectiveness of some contracts, publication of these contracts and Contract Register, as amended (hereinafter the "CRA"). The Parties hereby declare that all information contained in the Contract and its Annexes are not considered trade secrets under § 504 of the Civil Code and grant permission for their use and disclosure without setting any additional conditions.
- 18.6 The Parties agree that the Buyer shall ensure the publication of the Contract in the Contract Register in accordance with CRA.
- 18.7 The following Annexes form an integral part of the Contract:
- Annex No. 1: Technical specification on the subject of performance
- Annex No. 2: Seller's bid in respect of part which technically describes the device
- 18.8 The Parties, manifesting their consent with the entire contents of this Contract, attach their signature hereunder.

In Prague on 17. 10. 2017

In Zastávka on 12. 10. 2017

For the Buyer:

For the Seller:

[Redacted signature]

RN
Director

[Redacted signature]

Fyzikální ústav AV ČR
veřejná výzkumná instituce
182 21 Praha 8, Na Slovance 2
- 1 -



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Annex No. 1 - Technical specification on the subject of performance

The subject matter of this contract is:

X-band Electron Spin Resonance Spectrometer System (without magnet and power supply) and it should comprise:

(I) Microwave Unit

Microwave Bridge

- Microwave source: low noise Gunn diode;
 - Working frequency range: 9.2 – 9.9 GHz;
 - Built-in frequency counter with 1 kHz resolution;
 - Microwave frequency output;
 - Integrated controller for microwave frequency, attenuation, reference phase and bias setting;
- all microwave bridge parameters have to be software controlled.

Microwave Power

- Max output microwave power in unleveled mode: 600 mW;
- Output microwave power in leveled mode: 200 mW;
- Microwave power meter;
- Microwave attenuator: 0 – 60 dB in 1 dB steps;
- Attenuation precision: ± 0.5 dB;
- Automatic phase correction over attenuation range.

Automatic Frequency Control system (AFC)

- AFC stability: 10^{-8} ;
- AFC dynamic range: ± 4 MHz;
- Automatic AFC gain control.

Detection System

- Matched microwave reference arm with variable attenuation (bias) and phase shifter (working range 500° , resolution 0.1°);
- Signal low noise preamplifier: 30 Hz – 600 kHz;
- Ultra-low noise signal detection;

Tuning and Matching

- Manual bridge tuning and matching: tuning picture with up to 80 MHz sweep range and zoom function (optimal for both ultra-high and ultra-low Q-value resonators);
- Automated bridge tuning and matching: iris motor compatible with most X-band waveguide resonators;
- Automatically detection Q-value of a resonator in Tuning Mode;
- Indication the Q-value value in workstation software and storing it with other parameters in spectrum



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parameters file.

(II) High Sensitivity CW-EPR Resonator

- Max sample access: \varnothing 10 mm;
- Unloaded resonance frequency: 9.8–9.9 GHz;
- Unloaded Q-factor: > 15 000;
- Max modulation amplitude: 20 G;
- Window for optical access;
- Manual and automatic matching;
- Compatible with nitrogen and helium variable temperature units;

Sensitivity

- Weak Pitch signal-to-noise ratio: 2000 : 1;
- Absolute sensitivity: 1.6×10^9 spins / 1 G line width;

Calibration Sample Set

- BDPA: for modulation coils calibration;
- strong Pitch: for quick check of EPR spectrometer;

Sample Tube Set

- Quartz sample tubes ID 3 mm / OD 4 mm, CFQ quality (10 pcs);
- Quartz sample tubes ID 2.5 mm / OD 3 mm, CFQ quality (10 pcs);

(III) Console

System controller mainframe (19" rack), including cabling, system power supplies and Ethernet hub integrating all spectrometer devices in one high-speed network.

(IV) Magnetic Field Controller

- Operating range: -18 ... +18 kG (real values depend on a magnet system);
- Field accuracy over full range: < 500 mG;
- Center field setting resolution: 24 bit (1.5 mG);
- Max sweep width in one scan: -18 to +18 kG;
- Field sweep resolution: up to 256 000 points;
- Field sweep time: 320 μ sec to 5 sec/point;
- Short term field stability: ± 5 mG;
- Long term field stability: ± 10 mG/hour (with room temperature fluctuations < ± 1 °C);
- All circuits have to be digital.

(V) Signal Channel



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- Precision modulation frequency synthesizer: 4 – 100 kHz in 1 kHz steps;
- Digital integrating ADC;
- Signal amplitude resolution: 24 bit;
- Detection bandwidth: up to 300 kHz;
- Time constant: 0.01 msec – 5 sec;
- Simultaneous detection of first and second harmonic (EPR signal derivative);
- Simultaneous detection with 0° and 90° modulation phase;
- Phase setting resolution: 0.1°;
- Automatic routine for modulation amplitude and phase calibration for any frequency in the specified modulation frequency range;

(VI) Modulation Amplifier

- Operating range: 500 Hz – 120 kHz;
- High linearity.

(VII) Linux-based EPR Software Workstation

- OS: Linux;
- Processor with frequency > 3GHz, Quad-core processor with 8MB cache memory, 8 GB memory;
- 1 TB hard disk;
- Interfaces: USB, Ethernet;
- DVD-R/W;
- IPS flat screen Monitor, 23"-24";

Acquisition Controller

Should control all spectrometer devices via high speed Ethernet network interface.

Acquisition Server

The acquisition server is running on the front-end Linux computer connected to the EPR spectrometer via LAN. It has to provide the following functionalities:

- Controlling the different devices of the EPR spectrometer: magnetic field controller, signal channel, microwave bridge, etc.;
- Monitoring the devices in order to provide information about diode current, receiver level, microwave bridge state, etc.;
- Execution different acquisition methods: field and time sweeps, ENDOR sweeps, etc.;
- Software must provide the graphical user interfaces to control and monitor the EPR spectrometer and to perform EPR experiments using the acquisition server.

EPR Software Package must provide:



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- Graphical user interface for Linux-based OS;
- Full software control of all external devices;
- Internal and external triggering;
- Application programming interface;

CW Data Acquisition

- 1D sweep: field, time and radio frequency (with ENDOR unit);
- 2D sweep: field/delay, field/power, field/temperature (with nitrogen or helium variable temperature unit) and field/angle (with programmable goniometer);

Data Manipulation and Analysis

- Peak picking;
- Integration and differentiation;
- Spectrum algebra;
- Polynomial and exponential fittings;
- Line shape fitting for Gaussian, Lorentzian and mixture;
- Complex shape baseline correction;
- Filtering;
- $P_{1/2}$ analysis of saturation measurements;
- SpinFit module for the analysis of spin trapping data;
- Spectrum library used for identification spin trapping adducts;
- SpinCount module for quantitative EPR without reference sample;

Graphical Tools

- 1D data display: line, points, numbers, distances, histogram;
- 2D data display: 2D stack plot, 2D contour map, 2D density map, 3D stack plot (transparent/hidden lines);
- Line position, amplitude, distance and g-factor read-out;
- Interactive qualifiers for data manipulation, receiver gain, center field and sweep range;

Data Structure: BES3T, ESP (import/export), ASCII, PostScript, etc.

MS Windows based Spectra Manipulation and Analysis program

- 1D data display: spectral line, points, crosses, histogram;
- 2D data display: scan plot, 2D contour map, 2D density map, 3D stack plot;
- Cursor position read-out;
- Amplitude and distance measurement;
- Peak picking;
- Integration and differentiation;



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- Spectrum algebra;
- Complex shape baseline correction;
- Filtering;
- File handling and printing.

MS Windows based Simulation program

- Spectral simulation of liquids and powders with isotropic, axial and rhombic symmetry;
- Simulation based on 3-rd order perturbation theory;
- g-factor and hyperfine couplings;
- Zero field parameters;
- Line shape models: Gaussian, Lorentzian and mixture;
- Simulation of rotational correlation time (phenomenological treatment);
- Integrated periodic table of elements;
- Automatic search of field region (center field and sweep width);
- Read-in of experimental instrumental parameters (MW frequency, field range, modulation amplitude, time constant, etc.);
- Comparison to experimental spectra.

(VIII) 12 kW Bipolar Magnet Power Supply

Features:

- water cooled;
- three phase 380 Volts;
- dc current -60 A – +60 A;
- stability class 1×10^{-6} .

(IX) EPR ENDOR SYSTEM

Continuous wave ENDOR System enabling multi-resonance functionality (ENDOR Induced EPR (EIE), 2D ENDOR vs. Magnetic Field, Special and general TRIPLE resonance).

Includes:

- Dual channel RF source: 1 – 400 MHz;
- X-Band CW ENDOR resonator;
- Water cooled 50 Ohm load;
- 150 W RF Amplifier, 100 kHz-100MHz;
- Liquid helium dewar with ENDOR coil;
- ENDOR software package.

(X) Programmable Goniometer for waveguide resonators with a computer controlled vernier caliper to accurately set the rotational angle of samples.



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Fyzikální ústav AV ČR v.v.i.
 Na Slovance 1999/2
 182 21 Praha 8

Quotation No.: **BM-2017-00095**
 Date: **08.09.2017**
 Subject: **X-band Electron Spin Resonance Spectrometer Bruker EMXplus**

Item	Product	Product Description	Qty
1.	E7001046	EMXplus-A/P/L SYSTEM WITHOUT MAGNET & PS	1

EMXplus X-band CW EPR Spectrometer System (without Magnet and Power Supply)

Comprising:

System controller mainframe (19" rack), including cabling, system power supplies and Ethernet hub integrating all spectrometer devices in one high-speed network.

EMP Digital Ultra High-Resolution Hall Field Controller

- Operating range: -18 to +18 kG (real values depend on a magnet system)
- Field accuracy over full range less than 500 mG
- Center field setting resolution: 24 bit (1.5 mG)
- Max sweep width in one scan: -18 to +18 kG
- Field sweep resolution: up to 256 000 points
- Field sweep time: 320 μ s to 5 s/point
- Short term field stability: \pm 5 mG
- Long term field stability: \pm 10 mG/hr (with room temperature fluctuations < \pm 1 $^{\circ}$ C)
- All circuits are digital

EMP Digital Ultra High-Resolution Signal Channel Module

- Precision modulation frequency synthesizer: 4 – 100 kHz in 1 kHz steps;
- Digital integrating ADC
- Signal amplitude resolution: 24 bit
- Detection bandwidth: up to 300 kHz
- Time constant: 0.01 ms - 5 s
- Simultaneous detection of first and second harmonic (EPR signal derivative)
- Simultaneous detection with 0 $^{\circ}$ and 90 $^{\circ}$ modulation phase
- Phase setting resolution: 0.1 $^{\circ}$
- Automatic routine for modulation amplitude and phase calibration for any frequency in the specified modulation frequency range

Modulation Amplifier

- Operating range: 500 Hz – 120 kHz
- High linearity

Item	Product	Product Description	Qty
		<p>PremiumX Ultra Low Noise Microwave Bridge</p> <ul style="list-style-type: none"> - Microwave source: low noise Gunn diode - Working frequency range: 9.2 - 9.9 GHz - Built-in frequency counter with 1 kHz resolution - Microwave frequency output - Integrated controller for microwave frequency, attenuation, reference phase and bias setting; all bridge parameters are software controlled; <p>Microwave Power</p> <ul style="list-style-type: none"> - Max. output microwave power in unleveled mode: 600 mW - Output microwave power in leveled mode: 200 mW - Microwave power meter - Microwave attenuator: 0 - 60 dB in 1 dB steps - Attenuation precision: ± 0.5 dB - Automatic phase correction over attenuation range <p>Automatic Frequency Control (AFC)</p> <ul style="list-style-type: none"> - AFC stability: 10^{-8} - AFC dynamic range: ± 4 MHz - Automatic AFC gain control <p>Detection System</p> <ul style="list-style-type: none"> - Matched microwave reference arm with variable attenuation (bias) and phase shifter (working range 500°, resolution 0.1°) - Signal low noise preamplifier: 30 Hz - 600 kHz - Ultra-low noise signal detection <p>Tuning and Matching</p> <ul style="list-style-type: none"> - Manual bridge tuning and matching: tuning picture with up to 80 MHz sweep range and zoom function (optimal for both ultra-high and ultra-low Q-value resonators) - Automated bridge tuning and matching: iris motor compatible with most X-band waveguide resonators <p>Q-value Display</p> <ul style="list-style-type: none"> - Spectrometer automatically detects Q-value of a resonator in Tuning Mode at 33 dB, indicates this value in workstation software and stores it with other parameters in DSC file. <p>High Sensitivity Probehead</p> <ul style="list-style-type: none"> - Well suited for all sample types - Maximum sample access: $\varnothing 10$ mm - Unloaded resonance frequency: 9.85 GHz - Unloaded Q-factor: $> 15\ 000$ - Max modulation amplitude: 20 G - Window for optical access - Manual and automatic matching - Compatible with nitrogen and helium variable temperature units; <p>Sensitivity</p> <ul style="list-style-type: none"> - Weak Pitch signal-to-noise ratio: 2000 : 1 - Absolute sensitivity: 1.6×10^9 spins / 1 G line width; 	

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		<p>PC with Linux Operating System</p> <ul style="list-style-type: none"> - OS: Linux - Processor with frequency > 3 GHz, Quad-core, 8 MB cache, 8 GB RAM - 1 TB HDD - Interfaces: USB, Ethernet - DVD-R/W - TFT-Monitor 24" 	
		<p>Acquisition Controller</p> <p>Controls all spectrometer devices via high speed Ethernet network interface</p>	
		<p>Acquisition Server</p> <ul style="list-style-type: none"> - The acquisition server is running on the front-end Linux computer connected to the EPR spectrometer via LAN. It provides the following functionalities: <ul style="list-style-type: none"> • Controlling the different devices of the EPR spectrometer: magnetic field controller, signal channel, microwave bridge, etc. • Monitoring the devices in order to provide information about diode current, receiver level, microwave bridge state, etc. • Execution different acquisition methods: field and time sweeps, ENDOR sweeps, etc. - The acquisition server is logically placed between the user program Xenon and the spectrometer hardware controllers. Most of the hardware controlling is done via LAN - Xenon provides the graphical user interfaces to control and monitor the EPR spectrometer and to perform EPR experiments using the acquisition server 	
		<p>Xenon Data Acquisition and Processing EPR Software Package</p> <ul style="list-style-type: none"> - Graphical user interface for Linux-based OS - Full software control of all external devices - Internal and external triggering - Application programming interface (Python based API) 	
		<p>CW Data Acquisition</p> <ul style="list-style-type: none"> - 1D sweep: field, time and radio frequency (with ENDOR unit) - 2D sweep: field/delay, field/power, field/temperature (with nitrogen or helium variable temperature unit) and field/angle (with programmable goniometer) 	
		<p>Data Manipulation and Analysis</p> <ul style="list-style-type: none"> - Peak picking - Integration and differentiation - Spectrum algebra - Polynomial and exponential fittings - Line shape fitting for Gaussian, Lorentzian and mixture - Complex shape baseline correction - Filtering - P1/2 analysis of saturation measurements - SpinFit module for the analysis of spin trapping data - Spectrum library used for identification spin trapping adducts - SpinCount module for quantitative EPR without reference sample 	

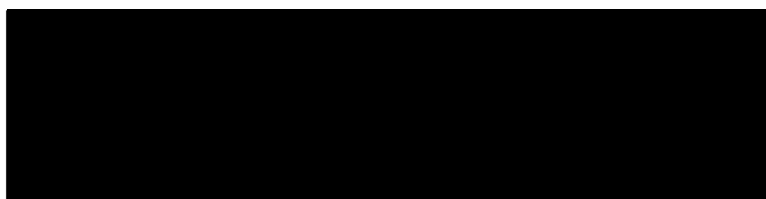
Item	Product	Product Description	Qty
		Graphical Tools <ul style="list-style-type: none"> - 1D data display: line, points, numbers, distances, histogram - 2D data display: 2D stack plot, 2D contour map, 2D density map, 3D stack plot (transparent/hidden lines) - Line position, amplitude, distance and g-factor read-out - Interactive qualifiers for data manipulation, receiver gain, center field and sweep range Data Structure <ul style="list-style-type: none"> - BES3T, ESP (import/export), ASCII, PostScript, etc. Calibration Sample Set <ul style="list-style-type: none"> - BDPA: for modulation coils calibration - Strong Pitch: for quick check of EPR spectrometer Sample Tube Set <ul style="list-style-type: none"> - Quartz sample tubes ID 3 mm / OD 4 mm, CFQ quality (10 pcs) - Quartz sample tubes ID 4 mm / OD 5 mm, CFQ quality (10 pcs) - Glass capillaries 50 uL (250 pcs) 	
2.	W1213644	ER083B BIPOLAR POWER SUPPLY (12kW) 12 kW Bipolar Magnet Power Supply Features: <ul style="list-style-type: none"> - DC current -60 A - +60 A - Stability class 1×10^{-6} - Water cooled - Three-phase 380 Volts - Compatible with 9.5" and 10" magnets 	1
3.	E5700909	EMXplus ENDOR SYSTEM The EMXplus CW ENDOR System enables multi-resonance functionality. Includes: <ul style="list-style-type: none"> - X-Band CW ENDOR resonator - Water cooled 50 Ohm load - 150 W RF Amplifier, 100 kHz-100MHz Requirements: EMXplus CW ENDOR System requires either a liquid nitrogen dewar (E4121160) or a liquid helium dewar (E4121170)	1
4.	E4121170	DEWAR WITH ENDOR COIL FOR ER4112HV The EN260VTDJ liquid helium dewar is used with the DICE-II CW ENDOR systems and ER4112HV and cryogen free variable temperature units.	1
5.	E2181001	PROGRAMMABLE GONIOMETER (WAVEGUIDE RES) Programmable Goniometer for waveguide resonators (ER218PG1) with a computer controlled vernier caliper to accurately set the rotational angle of samples.	1

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6.	E4001865	SOFT WINepr & SIMFONIA EPR Software Package for MS Windows Operating System <u>Note:</u> This software package requires Windows 7, 32 bit operating system (not included in this quotation). Features: Win-EPR: Spectra Manipulation and Analysis Program - 1D data display: line, points, crosses, histogram - 2D data display: scan plot, 2D contour map, 2D density map, 3D stack plot - Cursor position read-out - Amplitude and distance measurement - Peak picking - Integration and differentiation - Spectrum algebra - Complex shape baseline correction - Filtering - File handling and printing Win-SimFonia: Simulation Program - Spectral simulation of liquids and powders with isotropic, axial and rhombic symmetry - Simulation based on 3rd order perturbation theory - g-factor and hyperfine couplings - Zero field parameters - Line shape models: Gaussian, Lorentzian and mixture - Simulation of rotational correlation time (phenomenological treatment) - Integrated periodic table of elements - Automatic search of field region (center field and sweep width) - Read-in of experimental instrumental parameters (MW frequency, field range, modulation amplitude, time constant, etc.) - Comparison to experimental spectra	1
7.		24 months warranty	1
8.		Installation and Basic Training at site	1
9.		Packing, transport & Insurance	1

Total Bid Price DAP Praha excl. VAT 7 850 000,00 Kč

VAT 21% 1 648 500,00 Kč

Total Bid Price DAP Praha incl. VAT 9 498 500,00 Kč



Měřicí technika Morava s.r.o.