

Investigation of possibilities of project realization:

**Searching for optimal configuration of
Comprehensive Analyser of Matter Properties (CAMP):
Building of prototype, testing and demonstration of applications**

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During four month of preliminary investigation (19.03.2001-18.07.2001) the following tasks have been accomplished:

1. The number of International companies, producing equipment, which could be used for Comprehensive Analyser of Matter Properties (CAMP) building, has been contacted.
2. After getting the information requested from these companies, the optimal configuration of CAMP was chosen. It is presented in form of block-scheme below.

**The block-scheme of Comprehensive Analyser of Matter Properties (CAMP)
(Attached)**

3. The approximate prices of equipment for CAMP-system in accordance with proposals, we got from companies are presented below:

a) FT-IR spectrometer NEXUS-870 (Nicolet) with attachment "Seagull" (Harrick Sci. Co.) for reflection spectroscopy of strongly absorbed mediums in middle and far IR and dispersion of refraction index measurement: 600.000 FIM

b) Combined unit for simultaneous measurement of sound velocity and density in wide temperature interval: DSA 5000 (Anton-Paar): 170.000 FIM

c) Refractometer RE 40 (Oy GW BERG & Co Ab)..... 80.000 FIM

d) Reometer LVDV-III+CP (viscosimeter, Oy GW BERG & Co Ab) for independent control measurements: 120.000 FIM

The latter device - Reometer is necessary for independent control of calculations, performed by CAMP- related computer program.

Total price of equipment for CAMP assembly: 970.000 FIM

The total expenses for this two-year project, including salary for working group of professional engineers and scientists, price of possible additional and travel expenses is about 2.5 mln. FIM or 450.000 EUR

4. Demonstrational version of CAMP computer program, using C++ language, has been developed. This **Demo-CAMP** program, illustrates a wide possibilities of application of new **Hierarchic theory of condensed matter, general for liquids and solids** (Kaivarainen, 1995; 2000) on examples of water and ice in T-interval: 30 – 370 K.
5. The strongly squeezed version of the **Hierarchic theory of condensed matter**, published previously at the International electronic journal: "Archives of Los-Alamos": <http://arxiv.org/abs/physics/0102086>, has been prepared.

It demonstrates good correspondence between theoretical computer simulations and experimental data available on examples of ice and water.

6. The evaluation of **sensitivity of final results of computer calculation** of few important parameters of water (total internal energy, number of molecules in coherent clusters, vapour pressure, surface tension, thermal conductivity, viscosity and coefficient of self-diffusion) to **variation of primary parameters** (position of translational and librational bands in IR spectra, sound velocity, density and refraction index) in the range: $\pm 0\%$; $\pm 1\%$ and $\pm 3\%$ has been performed.

It is shown that our computer program is stable to such variations. For the other hand, deviations between calculated and experimental results usually correspond to $\pm 1\%$ or $\pm 3\%$ variation of primary data.

7. **A number of possible applications of CAMP for study of perturbation of aqueous systems physical properties under the electromagnetic field treatment have been proposed.**

I. Applications to aqueous systems

1. Monitoring of drinking water and water based beverage quality, related to their physical properties;
2. Investigation of electromagnetic and acoustic pollution, using physical properties of water as a test system (ecology problem);
3. In pharmaceutics technology - for monitoring of water perturbations, induced by vitamins and drugs at low physiologic concentrations. Correlation of water perturbations, induced by vitamins, drugs, physical fields, with biological activity of solutions;
4. Study of colloid systems, related to paper technology: Influence of electromagnetic and acoustic fields on physical parameters of the bulk and hydrated water for regulation of [coagulation - peptization] equilibrium of colloids and quality of paper;
5. In biotechnology and biochemistry: a wide range of problems, related to role of water in biosystems and water - biopolymers interaction (i.e. mechanism of cryoproteins action);
6. Mechanism of transition of flow from the laminar to turbulent one and the ways of this process regulation by means of electromagnetic and acoustic fields;
7. Evaluation of frequencies of cavitation fluctuations of water for the end of their effective resonant stimulation. It may be useful for:
 - a) de-infection of drinking water;
 - b) development of pure energy technology;
 - c) cold fusion stimulation.

II. Application to nonaqueous systems

1. Fundamental research in all branches of condensed matter physics: thermodynamics, dynamics, phase transitions, transport process, surface tension, self-diffusion, viscosity, vapour pressure, etc. (Universities and Research centers);

2. Monitoring of new materials technology for searching the optimal conditions (T, P, physical fields) for providing the optimal parameters on mesoscopic and macroscopic scale for their best quality;
3. Study of mechanism of high-temperature superconductivity;
4. Study of mechanism of superfluidity.

The following companies in Finland could be interested in these proposals and corresponding projects:

- Companies, producing cement, beton, etc.

Project: "Monitoring of result of EM treatment of water by CAMP, optimal for beton and bricks hardness elevation";

- Raisio Chemicals:

Project: "Influence of EM and acoustic fields on water clusters and hydration shell of colloid particles for regulation of their [coagulation - peptization] equilibrium", improving the quality of final products, i.e. paper and glue;

- Companies, related to green house products (tomato, onions, etc.).

Project: "Monitoring of EM field influence on physical properties of water by CAMP. Correlation with vegetables growth - stimulating effect";

- Nokia:

Project: "Influence of working EM frequencies of mobile telephone on water physical properties and structure/function of biopolymers in aqueous solutions. Finding the most effective insulation of EM radiation, if necessary".

- Alko:

Project: "Influence of EM field with selected resonant frequency, on the kinetics of beer and vine fermentation and taste;

- Companies, producing drinking water and Cola.

Project: "Monitoring of EM field influence on physical properties of drinking water by CAMP. Correlation with healing effect: lowering the blood pressure, concentration of cholesterol, etc. ";

- Pharmaceutical companies:

Project: "Influence of EM field with selected resonant frequency, on physical properties and biological activity of water-based drugs solutions".

CAMP could be very useful for monitoring of electromagnetic pollution of environment, using water physical properties as indicator. It is one of the most important problems of modern ecology.

The market for Comprehensive Analyser of Matter Properties (CAMP) is free and due to its huge informational potential (about 300 physical parameters) could be much bigger than that for IR, Raman or Brillouin spectrometers. The anticipated income of its manufacturing and marketing over the world has the order of about hundreds millions of \$ USA. The physical and chemical departments of the Universities and Research centers are most probable clients, as well as companies of above listed profiles.

