

Cross-Spectrum-Analysis with ICM+ in 4 Steps

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Cross-Spectrum-Analysis in 4 Steps

1. Raw Data

2. Spectrum Analysis

3. Transfer Function Analysis:

▶ Coherence, Phase, Gain

4. Basic Statistics



Spontaneous oscillations of CBFV and ABP

Fast Fourier analysis

M-waves: 3 to 9 cpm

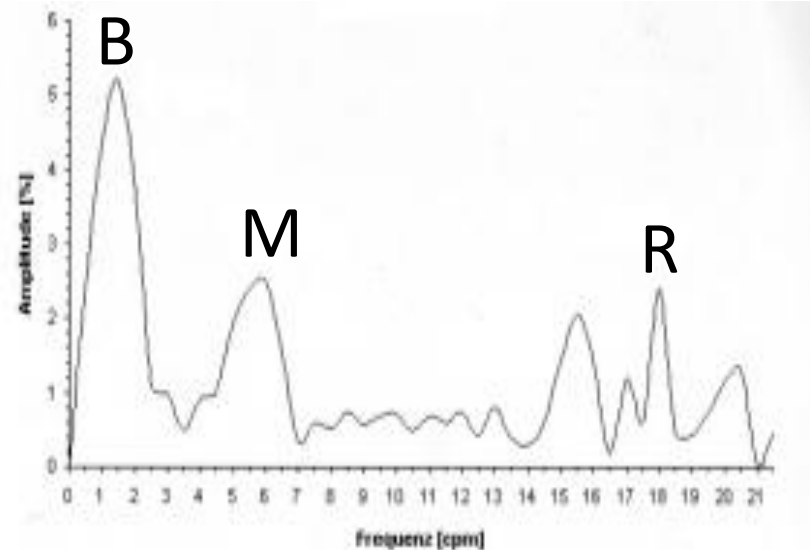
B-waves: 0.5 to 3 cpm

coefficients of variance (CoV)

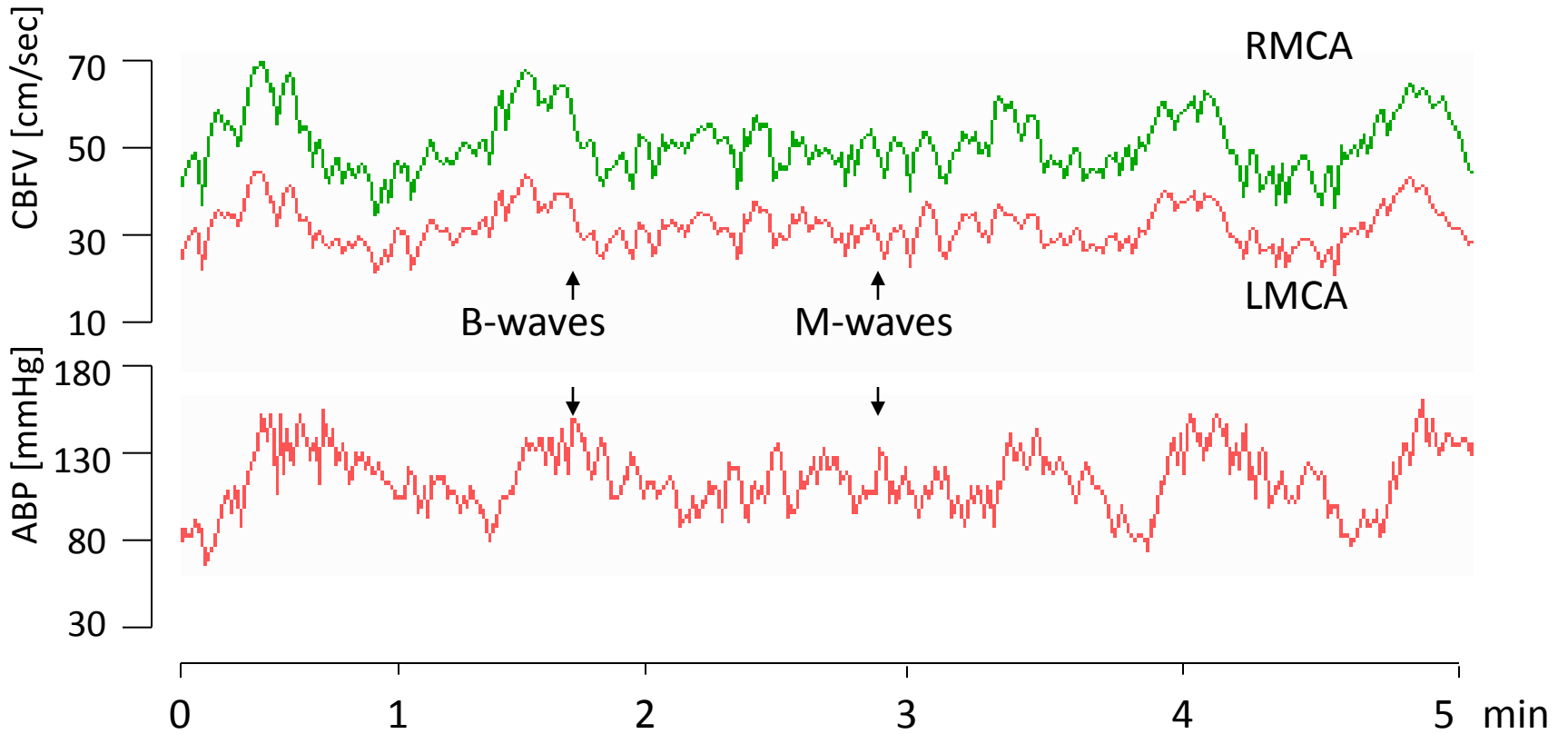
Cross-spectral analysis

coherence ($COH \geq 0.4$)

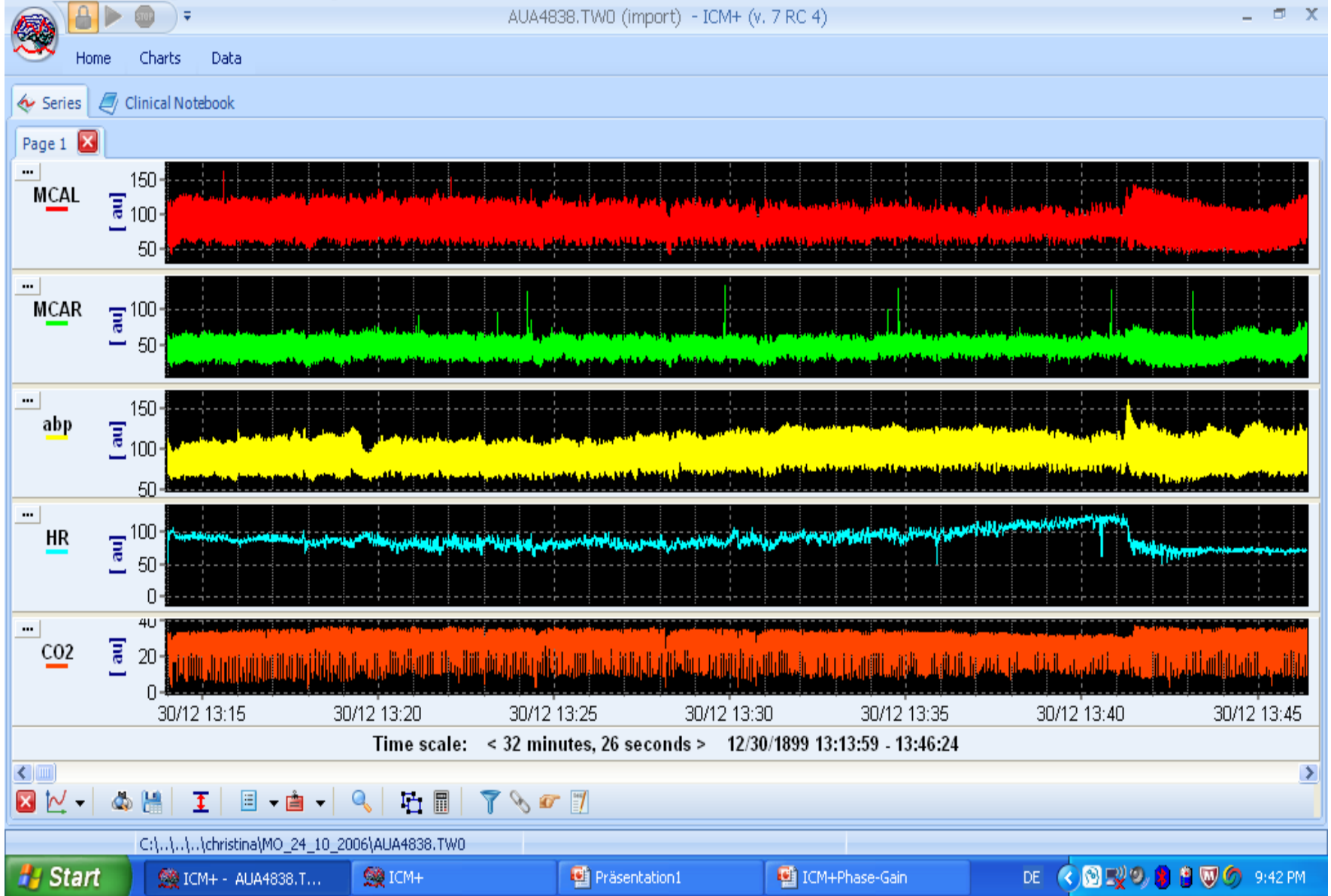
phase angle shift (ϕ) between -180 and



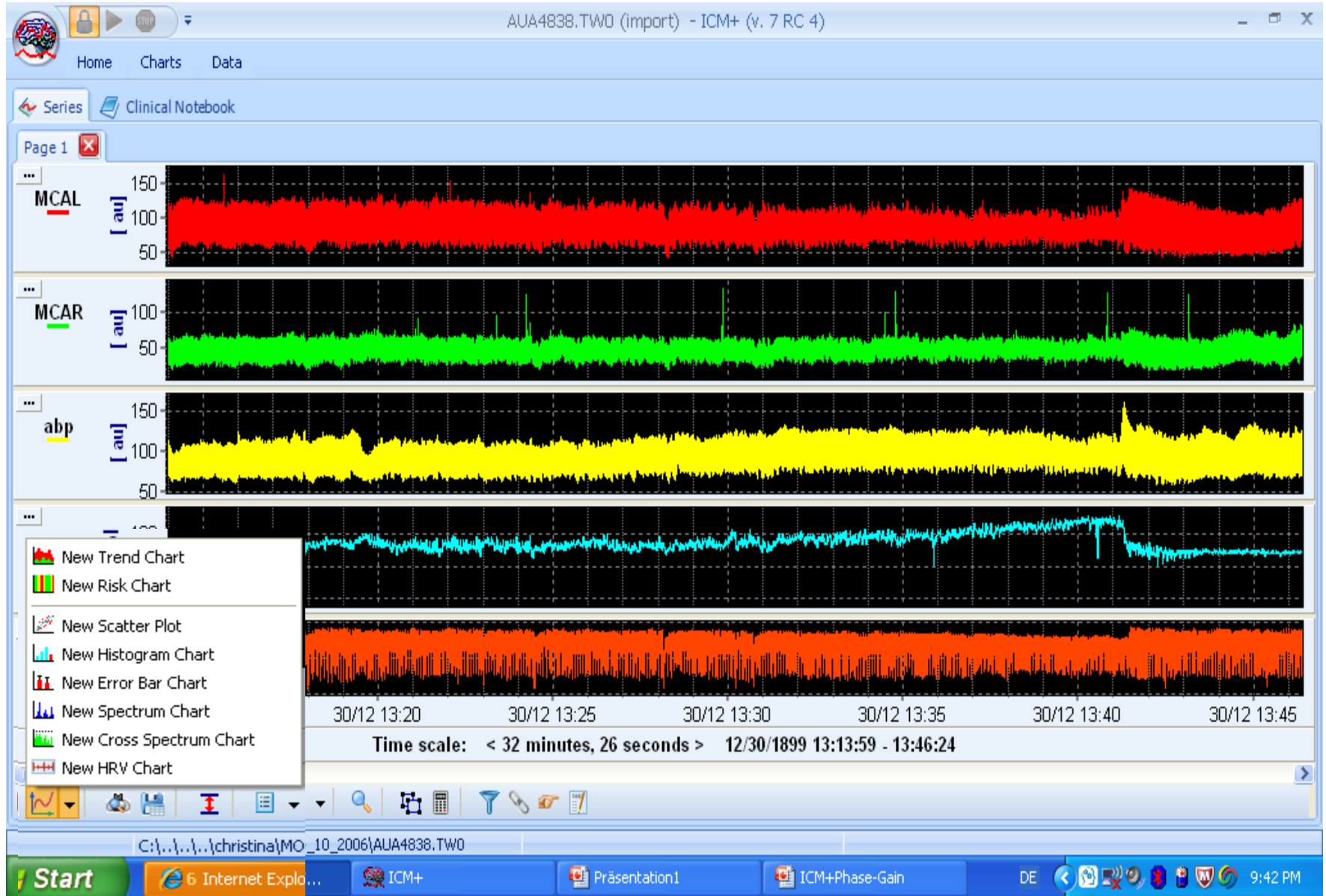
Spontaneous oscillations of CBFV and ABP



Step 1: Import of Raw Data



Step 2: Spectrum Analysis



Step 2: Spectrum Analysis

AUA4838.TWD (import) - ICM+ (v. 7 RC 4)

Home Charts Data

Users Projects Password Change Options Registration About System Configuration Help

Series Clinical Notebook

All signals

- MCAL
- MCAR
- ABP
- HR
- CO2

Amplitude [au]

30/12 13:15 30/12 13:20

30/12 13:40 30/12 13:45

Spectrum Analysis

Variables

ABP

Spectrum Analysis Methodology

Method: FFT
Spectrum Type: Amplit
Window: Hamming
Interpolation: 0

Segmentation/Averaging

Segments: 1
Overlap [%]: 0

Settings Calculator

Spectral Smoothing

Length: 0 Window: Bartlett

Harmonic Extension

Enable Harmonics: 0 Alpha: 0.00

Vertical Axis

Logarithmic
Span: 120
Scale: Relative

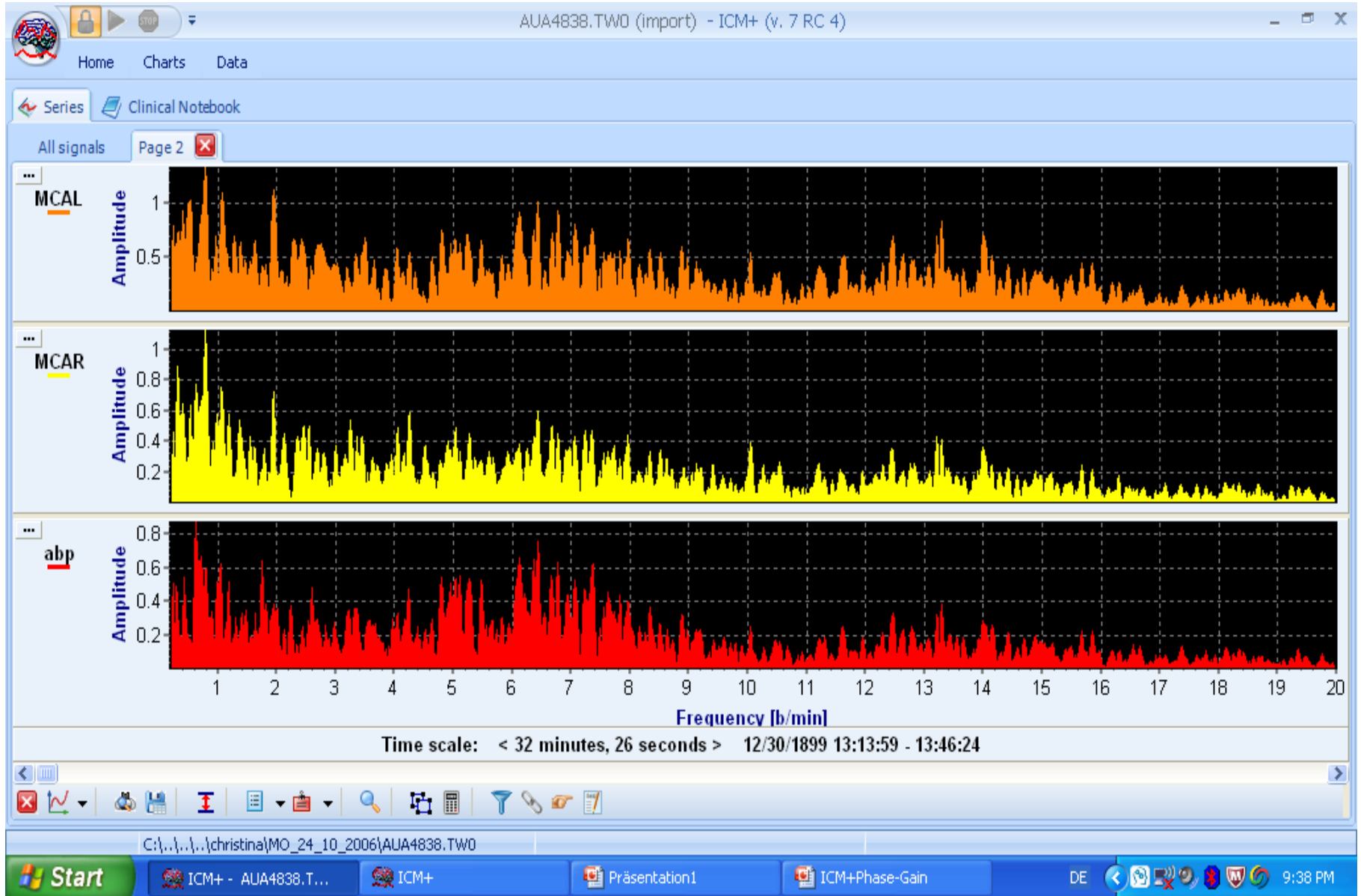
Frequency Axis

Logarithmic
Units: Hz b/min
Maximum: 10 Auto
Minimum: 0 Auto

Bottom Axis Title visible
 Bottom Axis Visible

OK Cancel

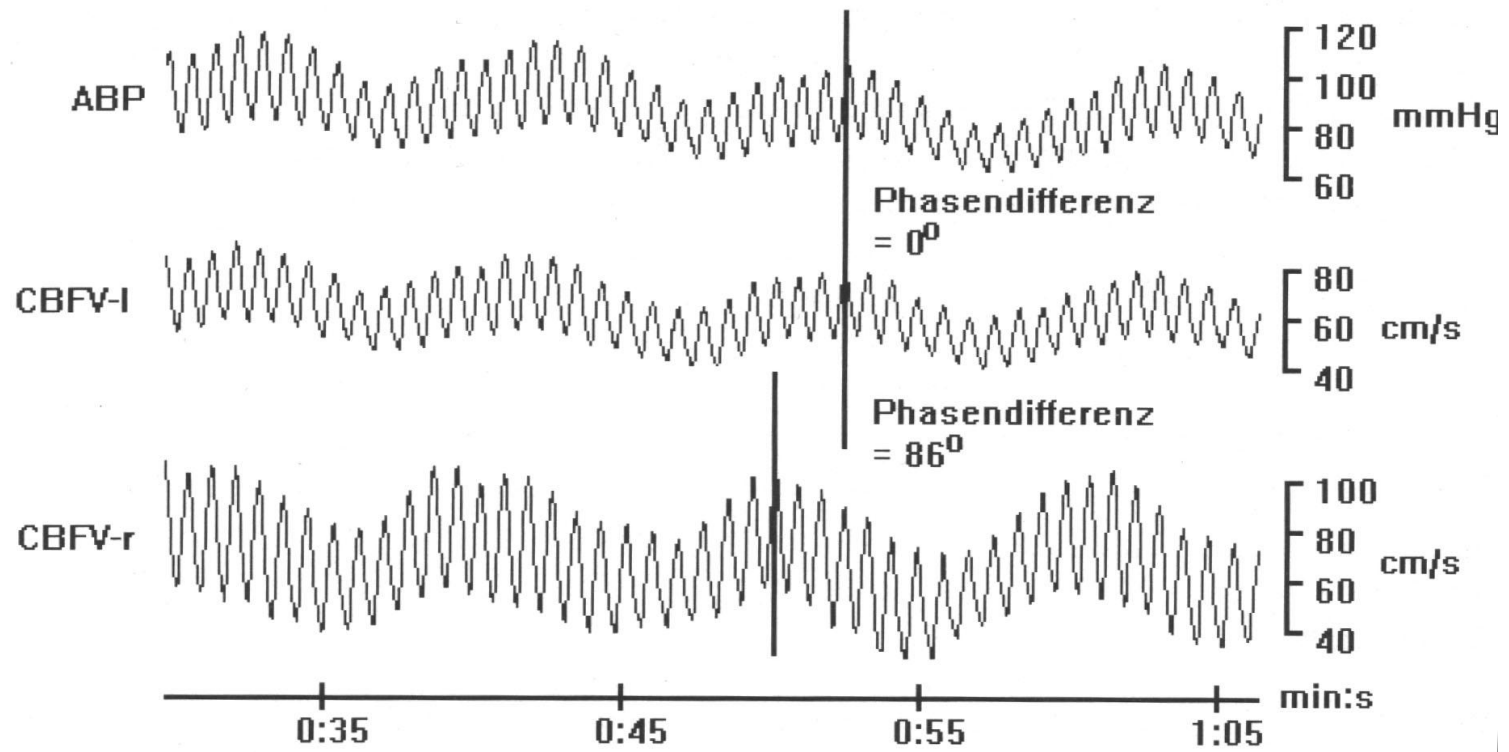
Step 2: Spectrum Analysis



Cross-Spectrum-Analysis between CBFV and ABP

Kohärenzbedingung ($\text{COH} \geq 0.4$)

Phasenverschiebung M-Wellen ($57.5 \pm 16.3^\circ$)



Step 3: Reanalysis - Formulas

(analysis) - ICM+ (v. 7 RC 4)

Home Charts Data

Signals Calculations Save Profile Load Profile Start Stop New Note New Event Monitor Tests Signal Calculator Artefacts Editor

Analysis Configuration Control Panel Data Tools

Series Clinical Notebook

Page 1 Page 2 Page 3

ABP [au]

hr [au]

co2 [au]

FVr [au]

FVI [au]

30/12 13:20
Time scale: < 32 minutes, 16

Primary Analysis Configuration Editor

Name : COHI

Calculation Window Specification

Calculation Period : 60 s

Update Period : 10 s

Valid values range

Max Value : 0

Min Value : 0

Enabled

Formula

Coherence(ABP,FVL,'BPM&LWR=3&UPR=9&SWLEN=17&MSQR=II')

Function Arguments :

abs

Function : Coherence

Options:

Function Arguments list: ABP, co2, FVL, FVR, hr

Function description:

OK Cancel

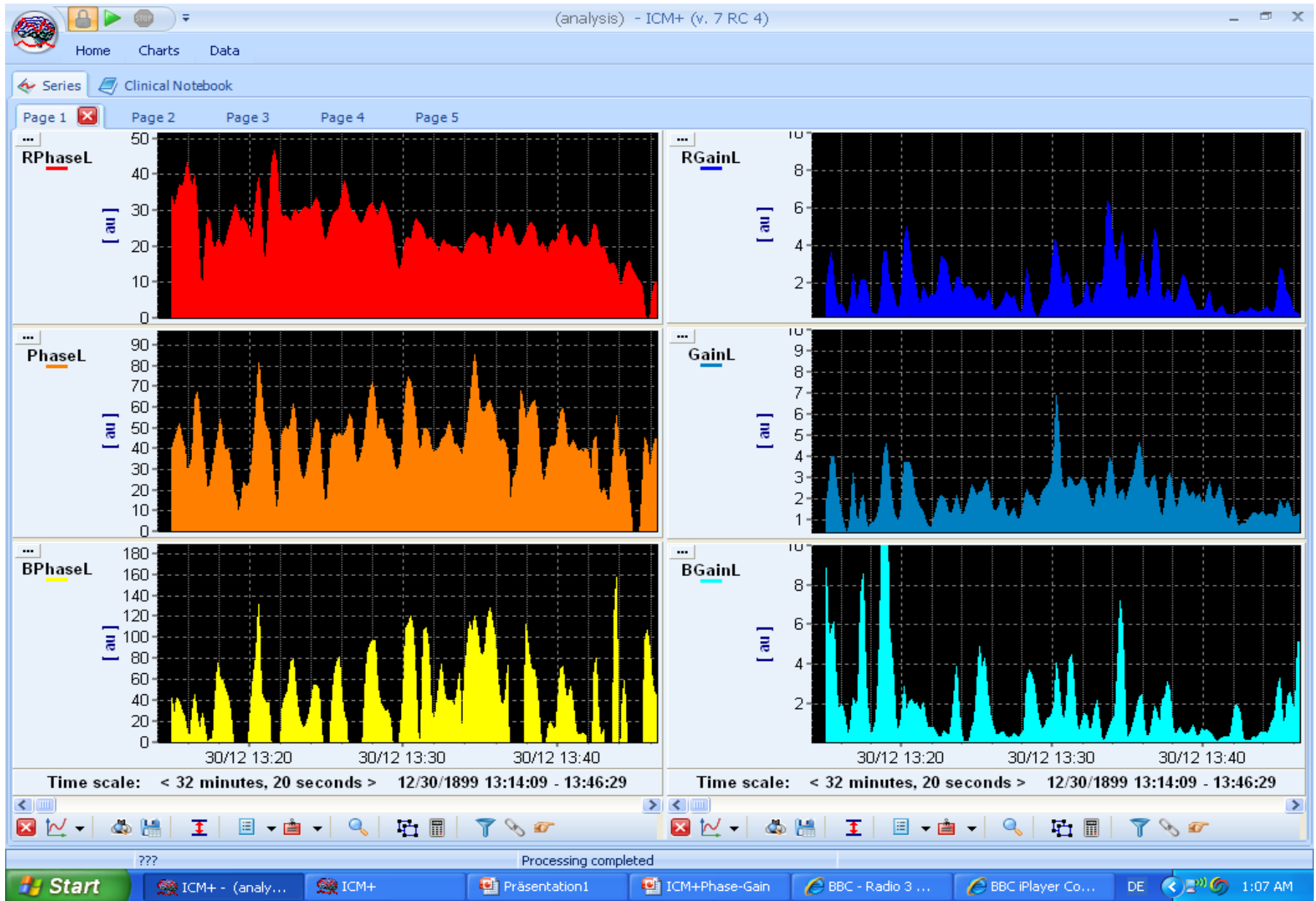
Processing complete ICM+ - (analysis)

Start 6 Internet Explorer Registry Reviver ICM+ - (analysis) Microsoft PowerPoint ... DE 12:26 AM

Step 3: Reanalysis - Results



Step 3: Results – 3 Frequencies: Phase / Gain



Step 4: Statistics – Phase 3 Frequencies

(analysis) - ICM+ (v. 7 RC 4)

Home Charts Data

Series Clinical Notebook

Page 1 Page 2 Page 3 Page 4 Page 5

RPhaseL [au]

PhaseL [au]

BPhaseL [au]

30/12 13:20 30/12 13:30 30/12 13:40

Time scale: < 32 minutes, 20 seconds > 12/30/1899 13:14:09 - 13:46:29

Basic Statistics Results

Selection: 99/12/30 13:34:07 Panel Only All Variables

| Variable | From | To | Mean | S.D. | Min | Max | Median | N | Period |
|----------|------------|------------|-------|-------|-------|-------|--------|----|--------|
| BPhaseL | 12/30/1899 | 12/30/1899 | 107.9 | 12.83 | 84.92 | 124.6 | 110.9 | 8 | 134.3 |
| PhaseL | 30/12/1899 | 30/12/1899 | 60.55 | 11.05 | 43.74 | 85.57 | 59.48 | 14 | 134.3 |
| RPhaseL | 30/12/1899 | 30/12/1899 | 22.34 | 2.438 | 17.02 | 26.80 | 22.50 | 14 | 134.3 |

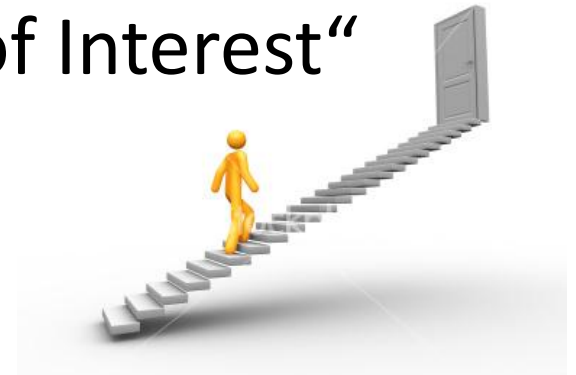
OK Print Copy Copy Special

Processing completed

Start ICM+ - (analy... ICM+ Präsentation1 ICM+Phase-Gain BBC - Radio 3 ... BBC iPlayer Co... DE 1:23 AM

Cross-Spectrum-Analysis in 4 Steps

1. Import: Raw Data
2. Fast Fourier Analysis Spectrum Chart:
3. Transfer Function Analysis:
 - ▶ Coherence, Phase, Gain
4. Basic Statistics in „Region of Interest“



Thank you for your attention !