Title: IACHEC Timing WG telecom

Date: 20 April 2021

Time: 13:00 UTC = 22:00 JST = 9:00 EDT = 6:00 PDT = 15:00 CEST

Zoom: https://zoom.us/j/91292380493 (passcode: iachec)

Notes: https://docs.google.com/document/d/1bsR2PlT2PZCiANMsb98XlBSJa4zJ-1kmjnMqLpA52yM/edit?usp=sharing

Participants: Yuki, Vinay, Kuiper, Dipankar, Felix, Katja, Matteo, Simon, Takaaki, Amy

Meeting Notes are shown in Red. (Participants can edit this page.)

Agenda

1. WG communication

2. Activity I: Summary Table of Timing Performance/Calibration

3. Activity II: Systematic survey of Timing Calibration of multi missions using Crab pulsar

0. Scope of this meeting

- **Summary of the IACHEC Workshop 2021**
    - ➤ April 2021
        - ✧ Plenary Series
            - April 16 (11am – 12pm EDT) on XRISM
            - April 23 (11am – 12pm EDT) on eRosita
            - April 30th (11am – 12pm EDT) on IXPE
        - ✧ WG telecom
            - In each WG **(this telecom)**
        - ✧ WG report & Discussion
            - May 17-19, 10am - 12pm EDT
    - ➤ September 2021
        - ✧ September 13–16, 2021 on Zoom

- **Timing WG telecoms & scope**
    - ➤ April 20 2021, 13:00 UTC = 22:00 JST = 9:00 EDT = 6:00 PDT = 15:00 CEST **(This meeting)**
        - ✧ quick review of what we did last year 2020
        - ✧ discussion what to do next
    - ➤ May 12 2021 14:00 UTC = 23:00 JST = 10:00 EDT = 7:00 PDT = 16:00 CEST
        - ✧ Check Status before May IACHEC meeting

1. Working Group Communication (short announcement)

1.1 Current Members & Mission

Yukikatsu Terada (Suzaku,Hitomi, XRISM), & his student Minami Sakama (XRISM)

Craig Markwardt (NICER),

Teruaki Enoto (NICER),

Matteo Bachetti (NuSTAR),

Katja Pottschmidt (NuSTAR),

Felix Fuerst (XMM-Newton),

Simon Rosen (XMM-Newton),

Vinay Kashyap (Chandra),

Amy Lien (Swift),

Guillaume Belanger(INTEGRAL),

Volodymyr SAVCHENKO(INTEGRAL),

Lucien Kuiper(INTEGRAL)

Xiaobo LI (HXMT),

Gulab Dewangan (Astrosat),

Dipankar Bhattacharya(Astrosat)

Makoto Sawada(XRISM),

Takaaki Tanaka (XRISM)

1.2 IACHEC Timing ML : iachec-time@heal.phy.saitama-u.ac.jp   (Please ask Yuki to update.)

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sakama@heal.phy.saitama-u.ac.jp,

L.M.Kuiper@sron.nl

1.3 IACHEC Slack

- 9 members on IACHEC/Timing Slack at this moment
  - Yuki, Vinay, Felix, Gulab, Katja, Matteo, Simon, Teru, and Xiaobo
- Please Join.
  - https://join.slack.com/t/iachec/shared_invite/zt-padwl8dd-agdsBrGAaLNc5Ljmf7uCuQ
- (Yuki has trouble using Slack client due to JAXA security policy from this April.)

1.4 IACHEC Timing WWW

- Address: https://iachec.org/timing/
- Please ask Yuki to update.

1.5 IACHEC Timing Wiki page

- Address: https://wikis.mit.edu/confluence/display/iachec/Timing
- Instruction to get account to edit this Wiki page: https://iachec.org/iachec-wiki/ (Ask Eric)
- Do you have some trouble getting an account??

2. Activity I: Summary Table of Timing Performance/Calibration

- Please see https://wikis.mit.edu/confluence/display/iachec/Timing
- Organizer: Yuki
- Action Item from notes last telecom
  - (A/I) divide "Absolute Time" column into "offset" and "deviation"

- Discussion
  - Yuki will update the table. If you have value, please let us know (you can write the below). → (A/I)
  - Comment: the definition of offset here is unclear: offset time relative to "Crab Main pulse" or "??"
  - → Add "Comments" also, and put more information there.
  - After gathering information here, Yuki will update the IACHEC Wiki page.
  -

Instrument	Absolute Timing Accuracy (offset)	Absolute Timing Accuracy (deviation, sigma)	Comments
RXTE/PCA			
RXTE/HEXTE			
Chandra/ACIS			
Chandra/HRC			
XMM-Newton/EPIC-MOS			
XMM-Newton/EPIC-PN	-354+-11 usec	108 usec (1 sigma)	
INTEGRAL/SPI			
INTEGRAL/IBIS			
Swift/BAT			
Swift/XRT			
Suzaku/HXD	~ 70 usec	360 +- 150 usec (90% err)	"offset" is defined from the difference from the average arrival time of Crab among X-ray missions and the HXD.

Suzaku/XIS	N/A	N/A	
NuSTAR/FPM		65 usec	
AstroSat/LAXPC	316+-70 usec		
AstroSat/CZTI	650+-70 usec		
HXMT			
Hitomi / SXS,HXI,SGD	120-230 usec	<3.0 usec (3 sigma)	
NICER			
eROSITA			
XRISM/Resolve	same as Hitomi	same as Hitomi	
XRISM/Xtend			
Fermi LAT			
Fermi/GBM			

3. Activity II: Systematic survey of Timing Calibration of multi missions using Crab pulsar

- Organizer: Matteo
- **Purpose**: comparison of Crab ephemeris among instruments.
  - 1. Cross Calibration
  - 2. Systematic check of the delay of main pulse in the X-ray to Radio
  - Note: please see the presentation by Kuiper in IACHEC 2018.
- Action Items & Steps from notes last telecom
  - send barycenter event fits file to Matteo from PoCs
    - (TIME list or event)
    - (cut energy by the recommendation of instrument) (provide PI to Energy conversion formula)
    - multiple epochs
  - Matteo can share the code among this WG.
  - Matteo will provide the repository;
    - https://drive.google.com/drive/folders/15Zoz3M7BkeoC33ip3ezP0kWXLOtcS94C?usp=sharing
  - Define the output (table)
- **Discussion & A/I**
  - Please put your barycenter event file(s) with the energy (PI) column (if we have) in the repository. Please delete/clean unnecessary information
  - No minimum length (exposure) of the observation.
  - by the end of April, please provide at least one epoch.
  - If we have trouble with access, please send a Google account to Matteo.

4. Other topics to discuss