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To whom it may concern.

I would like to begin by pointing out that even though I do not know Mr Bursa personally, I have been aware of some of his work in the field of Quasi-Periodic Oscillation in the X-ray flux of accreting neutron star and black hole for over a year.

Mr. Bursa's PhD thesis is a nice piece of work, reflecting the wide range of activities carried out by him in recent years. The thesis is well written and clear. There could have been a somewhat broader introduction, surveying current QPO models in a critical fashion. Except for this, however, the subjects are presented in fairly well organised and self-contained fashion.

The first part of the thesis gives a fairly detailed account of the salient features of fast Quasi-Periodic Oscillations in accreting black hole and neutron star systems. After extensive fitting of the correlations between the lower and higher frequency QPOs, Mr. Bursa discusses the intriguing possibility that there might be a relationship between the QPOs in black hole candidates and those in neutron star systems. This relationship is based on simple linear modelling of the QPO frequency correlations in neutron star system, carried out by Mr. Bursa. Among other things it suggests that different classes of neutron star X-ray binaries (the so-called Atoll and Z-sources) might be characterised by somewhat different neutron star masses. While no firm conclusion can yet be drawn from it, the relation discovered by Mr. Bursa might provide the basis for further development of QPO physical models.

The central part of the thesis is devoted to a critical assessment of the viability of epicyclic resonance model to the QPOs of the black hole candidate source GRO J1655-40. Mr. Bursa emphasises that this class of models produces estimates of the black hole spin that cannot be reconciled with the combination of black hole mass, obtained from optical observations, and spin, inferred from fits of the X-ray emission spectrum. On these grounds Mr. Bursa suggests a new type of resonance involving the vertical epicyclic frequency and the periastron precession frequency. While clearly interesting, this suggestion is not yet corroborated by theoretical evidence that there exists a physical mechanism capable of driving this new resonance.

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In the final part of his thesis, Mr. Bursa develops a relativistic model to calculate the oscillating signals produced by the global modes of an optically thin torus of matter orbiting in the close vicinity of the marginally stable orbit around a black hole. Detailed calculations are presented for a wide range of system parameters and the effects of changing the value of individual parameters are critically analysed and discussed. The context is the one provided by recent numerical simulations of accretion disks, which show the presence of a fairly long-lived torus-like region. It is worth pointing out that much denser torii around black holes have received a great deal of attention recently, in relation to the modelling of gamma ray bursts as well as the production of intense gravitational wave signals. This is certainly the most advanced and challenging section of Mr Bursa's thesis.

The variety of perspectives and approaches that Mr. Bursa has adopted in tackling a very difficult subject, the one of QPOs in accreting collapsed star systems, represent in my view the strongest point of this thesis. That no firm, incontrovertible conclusion is reached should not be surprising: the field of QPO research has had far more open problems than answers over the last two decades. It is nice to see a young scientist planting the seeds of new ideas out of his own initiative, while carrying out systematic pieces of research during his PhD program.

I believe that Mr. Bursa' thesis should definitely be accepted after he has successfully defended it. I recommend that Mr. Bursa obtains his PhD degree.

Sincerely

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