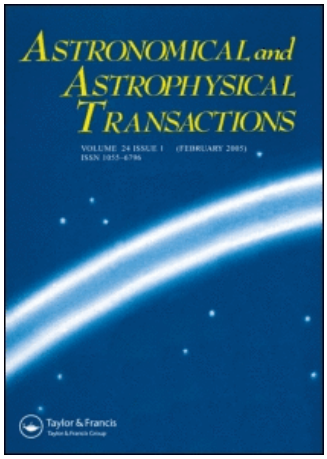
This article was downloaded by:[Bochkarev, N.]
On: 29 November 2007
Access Details: [subscription number 746126554]
Publisher: Taylor & Francis
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Astronomical & Astrophysical Transactions
The Journal of the Eurasian Astronomical Society
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713453505

On the dynamic formation of accreting intermediate-mass black holes

A. G. Kuranov [a]; S. B. Popov [b]; K. A. Postnov [ab]; M. Volonteri [c]; R. Perna [d]
[a] Sternberg Astronomical Institute, Moscow, Russia
[b] Department of Physics, Moscow State University, Moscow, Russia
[c] Department of Physics and Astronomy, Northwestern University, Illinois, USA
[d] Joint Institute for Laboratory Astrophysics (Space) and Department of Astrophysical and Planetary Sciences, University of Colorado, Colorado, USA

Online Publication Date: 01 February 2007
To cite this Article: Kuranov, A. G., Popov, S. B., Postnov, K. A., Volonteri, M. and Perna, R. (2007) 'On the dynamic formation of accreting intermediate-mass black holes', Astronomical & Astrophysical Transactions, 26:1, 87 - 89
To link to this article: DOI: 10.1080/10556790701300751
URL: http://dx.doi.org/10.1080/10556790701300751

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: http://www.informaworld.com/terms-and-conditions-of-access.pdf

This article maybe used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Downloaded By: [Bochkarev, N.] At: 13:10 29 November 2007

(ii) We calculate the exchange interactions of IMBHs with different binary systems or tidal captures of single stars in the disc.
(iii) Using a modified version of the SCENARIO MACHINE (see the online material at http://xray.sai.msu.ru/~mystery/articles/review/) (the binary population synthesis code [5]), we calculate the subsequent evolution of captured systems.

We find (figure 1) that neither mechanism of accreting binary IMBH formation is able to provide sufficient sources to explain the observed population of ULX sources. Even at sub-ULX luminosity, the total number of accreting IMBHs with $L > 10^{36}\,\mathrm{erg\,s^{-1}}$ is found to be less than 0.01 per galaxy.

Figure 1. Integral distributions of the accretion rate (a) for black holes wandering in a galactic halo and (b) for IMBHs formed in the Galactic disc from primordial metal-free gas: solid curve, systems formed via tidal captures; dotted curve and dashed curve, systems formed via exchange interaction (using fitting formula for the cross-section from [6] and from [7] respectively). The vertical dotted line shows the accretion rate, corresponding to the luminosity $L_{\mathrm{bol}} = 10^{40}\,\mathrm{erg\,s^{-1}}$, where $L_{\mathrm{bol}} = 0.1\dot{M}c^2$.

Downloaded By: [Bochkarev, N.] At: 13:10 29 November 2007

Acknowledgements

The work of A.K., K.P. and S.P. was partially supported by the Russian Foundation for Basic Research grants 04-02-16720 and 06-02-16025a. S.P. was also supported by the 'Dynasty' Foundation (Russia). S.P. is a Cariplo Foundation Fellow.

References

[1] E.J.M. Colbert and M.C. Miller, in *Proceedings of the 10th Marcel Grossmann Meting on General Relativity*, edited by M. Novello, S. Perez-Bergliaffa and R. Ruffini (World Scientific, Singapore, 2005), Part A, p. 530.
[2] M. Volonteri and R. Perna, Mon. Not. R. Astron. Soc. **358** 913 (2005).
[3] R. Jimenez and Z. Haiman, Nature **440** 501 (2006).
[4] S.E. Woosley, A. Heger and T.A. Weaver, Rev. Mod. Phys. **74** 1015 (2002).
[5] V.M. Lipunov, K.A. Postnov and M.E. Prokhorov, Astrophys. Space Sci. Rev. **9** 1 (1996).
[6] P. Hut, D. Heggie and S.L.W. McMillan, Astrophys. J. **467** 359 (1996).
[7] J.G. Hills, Astron. J. **103** 1955 (1992).